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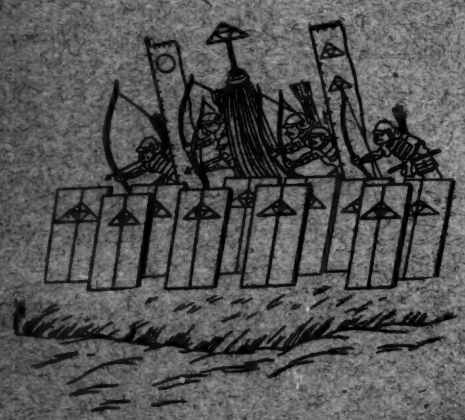

Defence of a river by ancient Japanese archers who shoot from behind a barricade of shields probably made of bamboo and covered with leather. The armorial bearings of the Hojo dynasty are seen upon the general's tasselled standard and upon the shields. Date, A.D. 1333.

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# Memorandum

UPON

# SURGICAL SHOCK AND SOME ALLIED CONDITIONS.

ISSUED BY

## THE MEDICAL RESEARCH COMMITTEE

*(February 27th, 1917).*

THE phenomenon of oligaemia—or reduction of the volume of the blood in effective circulation—has figured prominently in the theories of surgical and traumatic shock (due, in the main, to American investigators) which have been current during recent years. There is no need to emphasize the importance at the present time of this condition, or that of the acute circulatory failure, similar to this in so many respects, which characterizes some of the graver forms of infection and toxaemia. Information has reached the Medical Research Committee concerning some separate experimental inquiries into these conditions which are at present in progress on behalf of the Committee, and which promise to throw light on the production, by causes which have so little immediately obvious connexion with one another, of these groups of symptoms having so many points in common.

It appears to the Committee most desirable that clinical observations, bearing on the importance of the different suggested factors in the genesis of shock and allied conditions, should proceed concurrently with the further experimental investigations. They have, therefore, with the consent and aid of the investigators concerned—to whom they are greatly indebted—prepared the following preliminary notes for circulation among those having opportunity for clinical observation, and they have ventured to add some suggestions for the practical application of the results already gained, which seem to them worthy of attention and trial.

### I.

H. H. Dale and P. P. Laidlaw, whose primary object was a closer analysis of the shock-like phenomena produced by injection of various protein and bacterial poisons, of the sensitizing antigen into an anaphylactic animal, etc., resumed, in the first instance, their examination of the action of the base β iminazolylethylamine ("histamine"), the shock-like action of which they described some years ago. Taking readings of the haemoglobin value of the arterial blood with Haldane's haemoglobinometer, or of the percentage volume of corpuscles in the blood with a haematocrit, they find that the profound fall of blood pressure produced by this substance is accompanied by a striking concentration of the blood, amounting in some cases to a loss of one-half the original volume of plasma in about five minutes. The liver appears to be the organ most actively concerned in this reduction of the plasma volume; but it is not exclusively responsible, for the phenomenon occurs, though less regularly, when the drug is injected after exclusion of all the abdominal viscera. The concentration is apparently effected not merely by loss of water and diffusible constituents, but by the passage into the tissues and lymph spaces of all the plasma constituents, since the protein content of the plasma does not rise in proportion to the reduction of volume.

If an animal, moribund from this type of shock, is opened, it is found that the heart is executing muscular beats of moderate vigour, although the arteries are pulseless. The veins are not distended, and the great veins fill only very slowly from the periphery if clamped. A large part of the blood, in fact, has disappeared from effective circulation, and the weakness of the heart-beat is due to defective inflow from the veins.

The condition cannot wholly be explained by the loss of plasma volume above described, for Dale and Laidlaw have several cases on record in which the drug produced a "shock" of some severity, with the general signs of oligaemia as above described, but with no loss of plasma, as measured by concentration of corpuscles, or a loss so small as to be quite inadequate to explain the effect. They further regard a loss of tone of the smaller arteries as insufficient to account for the extreme circulatory depression (the still incomplete evidence points rather to these being *constricted* in these circumstances), and provisionally attribute the shock in the first instance to a widening of the whole capillary area in the viscera and the musculature. The active contractility of the capillaries has been frequently described, and important evidence of its existence in man has just been provided by Cotton, Slade, and Lewis (*Heart*, 1917). Dale and Laidlaw suppose that, under the action of the poison, the capillary tone is lost, so that, the blood from the arteries being diffused and stagnant among the slack capillary channels, the quantity of blood reaching the veins is inadequate for the filling of the heart. The cardiac output falls in consequence to a very low level.

An attempt will be made to test by direct experiment this hypothesis of circulatory stagnation as the result of general loss of tone of the capillaries. About the main fact—that there is a depletion of the macroscopic vessels both on the arterial and venous sides—there can be no room for doubt; and it will be obvious how this deficiency of blood volume, relative to the total capacity of the system, will be aggravated by the direct reduction of the blood volume, owing to loss of plasma into the tissue spaces which usually accompanies it. The already sluggish circulation will be further impeded by the increase of the viscosity of the blood, mainly due to the increase in the proportion of corpuscles to plasma. This change of viscosity has been directly observed by Trevan (*vide infra*). The slowness of the capillary circulation, again, through the muscles and other tissues needing a plentiful supply of oxygen, will lead to defective oxidation, with resulting acidity, and so to a further tendency for passage of water by osmosis from the blood, as suggested by Henderson. Lastly, the fall of arterial pressure, owing to defective filling of the chambers of the heart, and the increased viscosity of the blood, will so reduce the rate of the coronary circulation as eventually to interfere with the nutrition and oxygenation of the heart muscle itself. It will be seen, therefore, that when once the described condition is established, a series of "vicious circles" is set up.

The determination of the change of plasma volume from haemoglobinometer readings may be illustrated by an example. From a cat (under ether) an initial sample of arterial blood gave a haemoglobinometer reading of 80 per cent. When the profound shock produced by intravenous injection of 10 mg. of the biphosphate of histamine (about 3 mg. of the base) had fully developed—that is, about seven minutes after the injection—a second arterial sample gave a haemoglobinometer reading of 120 per cent. In order to translate these values into relative volumes of corpuscles and plasma, we must know the initial ratio of these volumes, and assume a constancy of haemoglobin content in the corpuscles. The haematocrit showed that the corpuscles originally occupied one-third, and the plasma two-thirds of the blood volume, which is a normal ratio for a cat. The rise of the haemoglobinometer reading from 80 to 120 per cent. must be taken to indicate an increase in the proportional volume of corpuscles in the same ratio. So that the percentage of corpuscles has risen from 33.3 to $33.3 \times \frac{120}{80} = 50$. If the volume of corpuscles has remained constant, this change of proportion indicates a fall of plasma volume from 66.6 to 50 per cent. In other words, the plasma, which originally occupied twice as great a volume as the corpuscles, now occupies a volume equal to that of the corpuscles, so that one-half of the plasma has disappeared from the circulation. A haematocrit determination on the second sample actually showed the corpuscles and plasma occupying equal volumes, so that the assumption of a practically constant haemoglobin content in the corpuscles was justified. The only means, other than the loss of one-half of the plasma, by which such a change could be effected, would be a *doubling* of the number of red corpuscles in circulation, and it does not seem credible that this could occur in the course of a few minutes. It should be noted, further, that the arterial blood, on which the readings were made, represents a mixture of all the blood reaching the heart from the different organs. Blood taken from the portal vein, when the shock-like condition has been produced, shows an even greater concentration than that from the arteries; and even this portal blood contains an undue proportion of blood from those of the capillaries in the

splanchnic area in which the circulation is still relatively effective. It must be supposed that in many the vanishing arterial pressure is no longer able to maintain a circulation, so that the blood in them is stationary and its concentration extreme.

Being impressed with the similarity of such a condition to surgical "shock," Dale and Laidlaw have made a short series of attempts to produce such a shock in anaesthetized cats by prolonged manipulation of the abdominal viscera, which, as Mann and others have pointed out, is the only method by which a traumatic shock can be produced in Carnivora. In two cases profound shock, with no tendency to spontaneous recovery, was obtained, and in both these such a rise of haemoglobin value was observed, concurrently with the onset of the shock, as to indicate a serious depletion of the plasma volume. In others a less profound shock was obtained, with a tendency to spontaneous recovery when the abdominal wound was closed and the animal left to itself under the anaesthetic; in these no significant change in the haemoglobin value was observed. In these cases, also, the manipulated bowels became conspicuously reddened and ultimately bluish in appearance, but the blood pressure could be temporarily driven almost to its original high level by compressing the whole mass of intestinal coils and so driving the blood out of their capillaries into the general circulation. In these cases, therefore, such shock as was obtained seemed to be due purely to stasis in the abdominal capillaries, as previously described by Mann.

Meanwhile, Captain Marshall, R.A.M.C., had commenced a series of observations in France on the haemoglobin content of the blood in the different classes of case met with in a casualty clearing station. The Committee understand that among Captain Marshall's observations are some on shock which support the view that loss of plasma into the tissues is an important factor in the condition.

## II.

β iminazolylethylamine (histamine) was chosen by Dale and Laidlaw for this investigation as a pure substance, producing effects of the kind under investigation in exact dosage. Effects of the same general type are produced by many products of protein digestion, bacterial products, etc. Among such effects, those due to the so-called toxaemia of gas gangrene are of special importance at present. The resemblance between the symptoms of this condition and those of surgical shock, or of a severe haemorrhage, has frequently been described.

An investigation is now being carried out by H. H. Dale and J. McIntosh into the symptoms presented by animals dying after a local infection of the limb muscles by organisms of the gas gangrene group, isolated from material obtained from fatal human cases. The onset of a fatal shock-like condition in such experiments has again been found to be associated with a progressive rise in the corpuscular content of the blood pointing to a steady loss of plasma. It may be pointed out that such an effect was perhaps to be expected. The capillaries in the tissues surrounding the infected muscle are so affected that an enormous local outpouring of plasma occurs. Whether the general symptoms are due to passage of the infecting organisms into the general circulation, or to the absorption through the lymph channels of toxic products of the local breakdown of muscle, effects on the general vascular endothelium of a similar kind, though much less in degree than those produced by the concentrated local action, might be expected. A general loss of capillary tone and a morbid increase of permeability of capillary walls might therefore be expected to result from absorption into the general circulation of the fluids from the infected area. The evidence as yet available confirms this expectation, and suggests that there is a fundamental similarity of origin, underlying the similarity of symptoms, between the toxaemia of gas gangrene and other shock-like conditions. It must be remembered, however, that failure of the heart from any cause will be attended by some degree of blood concentration, if the process is sufficiently gradual. More work is needed before the significance of the phenomenon in these cases can be estimated with confidence.

## III.

Concurrently with the foregoing investigations, F. A. Bainbridge and J. W. Trevan have been conducting an investigation into the genesis of shock by other means, and the same factor of concentration of the blood has presented itself in their observations. Their experiments hitherto have been mainly concerned with the effects on the portal and systematic venous pressures, and on the general distribution of blood in the circulation produced by repeated injections or by long-continued slow infusion of adrenalin. The inquiry was suggested by the fact, demonstrated by Elliott, Cannon, and others, that extreme emotion or severe pain, which are factors in some cases of shock, are accompanied by an outpouring of adrenalin from the suprarenal glands. Bainbridge and Trevan have injected adrenalin slowly into a systemic vein in anaesthetized dogs for twenty minutes or longer, at a rate sufficient to maintain the arterial pressure at a supranormal level comparable with that attained during moderate stimulation of a sensory nerve. During the injection the portal pressure rose to and remained at a high level, while the systemic venous pressure was not significantly altered, or even fell slightly. Meanwhile readings with the haemoglobinometer and the haematocrit showed a steady decrease in the volume of the blood plasma relatively to that of the corpuscles. In one case the haemoglobin value rose from an initial 95 per cent. to 129 per cent. Such a relative increase of corpuscular content would involve a large increase in the viscosity of the whole blood; an actual determination showed an increase of viscosity in the proportion of 6.8 to 9.1.

When the injection of adrenalin was stopped, the arterial pressure rapidly fell to a low level while the portal pressure remained high, and the animal passed into a condition of shock, with feeble pulse and shallow respiration. The relation of the portal and systemic venous pressures indicated an obstruction of some kind to the flow of blood through the liver. This was made further evident, in the later stages of the effect, by the striking turgidity of the liver itself. If the flow of lymph from the thoracic duct was recorded, it was observed to undergo a striking acceleration, as the obstruction in the liver developed in consequence of the infusion of adrenalin. The nature of this obstruction is not yet clear, and will be the subject of further investigation. Its effect, especially after the cessation of the inflow of adrenalin has allowed a dilatation of the splanchnic arterioles, is a collection of a large part of the blood in the congested splanchnic area. When to this is added the steady loss of fluid from the blood by exudation into the tissues, it will be seen that the final result, as regards the activity of the heart and the general circulation, will be closely similar to that described above in connexion with Dale and Laidlaw's experiments. The failure of the output of the heart from defective venous inflow, due to reduction of the volume of blood in effective circulation, leads to a profound collapse of the arterial pressure; the loss of plasma into the tissues not only aggravates this defect of volume, but, by increasing the viscosity of the blood, further retards such flow through the capillaries as the low arterial pressure could otherwise maintain; and this retardation yet further checks the venous inflow to the heart. The blood travels very slowly round the body under such conditions, and the supply of oxygen to all the tissues becomes inadequate. This inadequacy is accentuated by defective oxygenation of the arterial blood, which remains dusky in colour even with artificial respiration.

## IV. *Some Practical Suggestions and Inquiries.*

(A) The point of most novel interest emerging from the above notes is the importance which the different sets of workers attribute to loss of plasma into the tissue spaces, as a factor in the production of the circulatory failure. The presence of such a factor was suggested by Henderson, Mann, and others, but its extent and significance have hitherto been rather vaguely indicated. Such loss of fluid from the blood, causing both deficient volume and excessive viscosity, has for some time been clinically recognized as an essential factor in the collapse occurring in conditions like those of cholera and bacillary dysentery, in which the fluid is lost through more obvious channels.

It is here suggested that clinical observation on changes in plasma volume in traumatic shock, post-operative shock, and the toxaemia of gas gangrene may yield valuable information. The only instruments clinically

applicable to the detection of such changes are the haemoglobinometer and the haematocrit. It will be evident that the interpretation of such observations will be a more complicated matter than that of results obtained under the controlled conditions of experiment; for an estimate of the plasma volume by these methods depends on the assumption that the volume and haemoglobin content of the red corpuscles remains constant. It cannot, for example, be expected that a loss of plasma occurring in shock consequent on an extensive wound, with much haemorrhage, will be accompanied by an absolutely high haemoglobin value or haematocrit reading. Again, in a protracted case of toxaemia from gas gangrene, the observation will be vitiated by the probability that, though plasma may be draining from the vessels into the tissue spaces, a coincident destruction of red corpuscles is taking place. It is hoped, however, that a careful selection of suitable cases for observation, and attention rather to change of the corpuscular content, as shown in a series of observations at short intervals, than to the absolute initial value, will enable information to be obtained as to the significance of this factor. It may be suggested that cases of traumatic shock without serious haemorrhage, of post-operative shock, of intestinal obstruction, of extensive burning, of anaphylactic shock, and of the rapid, fulminating type of toxaemia from gas gangrene, are likely to give relatively uncomplicated data for this purpose.

(B) The experimental results suggest that the removal of blood from effective circulation may be brought about in more than one way. It would be of interest to know whether different types of shock can be clinically recognized; in particular, whether a type with circulatory obstruction in the liver, as shown by swelling of this organ and congestion of the portal vein and its tributaries, can be differentiated from a type without this feature; and, if so, whether the nature of the primary cause of the shock has any relation to the type produced.

(C) *Prevention.*—If shock is, indeed, due to oligaemia, its many points of similarity to the collapse produced by a dangerous haemorrhage need no explanation. It will further be obvious that an antecedent haemorrhage, insufficient in itself to produce collapse, may be an important factor in the subsequent onset of shock, in so far as this condition is due to defective volume, apart from increased viscosity of the blood. The normal reaction to a simple haemorrhage, of sufficient severity to diminish the output of the heart and lower the blood pressure, consists in the abstraction of fluid from the tissues until the volume of the blood is again adequate to maintain the cardiac output. Dale and Laidlaw find that a similar dilution of the blood normally accompanies, and tends to correct, a fall of pressure due to arterial dilatation. In shock, according to the indications of the experiments already described, this restorative reaction fails completely and fluid continues to pass from the blood, though the arterial pressure has fallen to a very low level. It will be evident, therefore, that, when shock is already imminent, a relatively small haemorrhage may have a serious influence in determining its onset. Any other causes tending to diminish the blood volume, such as fatigue, exposure, or prolonged abstinence from food and water, may be expected to predispose to shock for a like reason. Mention should be made also of the possibility that measures preparatory to an operation in hospital, if they include free saline purgation and severe abstinence from food and water, may contribute to the danger. Cases for urgent operation must constantly present themselves to the military surgeon in which the antecedent conditions are those mentioned above as tending to depletion of the blood volume, and therefore predisposing to shock. A free supply of fluid, by infusion of physiological saline into the rectum or the subcutaneous tissues, as already used by many surgeons, may be expected to have a special preventive value in such cases. The indications, however, are that such measures, to have any value, must be begun before or early in the operation. When once the condition of shock has been developed, physiological saline, or Ringer's solution, even if injected intravenously in large volume, appears to have a very limited and temporary value; for the diluted plasma passes with increased rapidity through the slack and permeable walls of the capillaries, and the fluid leaves the circulation almost as quickly as it is run in.

(D) *Treatment.* Unfortunately, little can be said as yet as to the treatment of shock and allied conditions when once developed. Suggestions only can be made of measures which may be tested with possible advantage and without danger. It is hoped that further experiment may warrant more positive recommendations at a later stage. Pituitary extract causes a prolonged and general contraction of the arterioles, and thereby diminishes the total capacity of the circulatory system and mitigates the effect of deficient blood volume. The tendency of adrenalin to produce obstruction to the circulation through the liver, as described above, makes it probable that the use of this substance would, in some cases, eventually aggravate the condition which it was designed to cure; its action is, in any case, so fugitive as to be of little value. The action of pituitary extract is free from both these drawbacks; its value in some cases is already well recognized, and, with the ordinary measures for restoring and conserving the body temperature, needs no further mention.

The failure of injections of physiological saline in fully developed shock has already been mentioned. Experiments already made seem to indicate that better results might be obtained by the use of intravenous injections of hypertonic saline, the value of which in the treatment of cholera and bacillary dysentery is already familiar. Whether the action of these is entirely due to the passage of water into the vessels by osmosis, or in part to a restorative effect of the hypertonic solution on capillary tone, is not clear. In this connexion it may be recalled that calcium ions have been found to have a specific action in reducing abnormal permeability of capillaries (cf. Wright; also several papers from the Vienna school). It seems reasonable, therefore, to suggest that a fluid representing a concentrated Ringer solution should be used, rather than one in which only the proportion of sodium chloride is increased. The following formula might be tried:

| | |
|---|---|
| Sodium chloride ... ... ... | 2 grams |
| Potassium chloride ... ... ... | 0.05 gram |
| Calcium chloride ... ... ... | 0.05 ,, |
| Water... ... ... ... ... | 100 c.cm. |

and the value of increasing the relative calcium content beyond this proportion might cautiously be tested.

The deficient oxidation occurring in any condition of circulatory failure will lead to an abnormal acidity of the tissues, and thereby tend to raise the concentration and viscosity of the blood in the capillaries. Administration of alkalis should therefore help to relieve the condition, and injections of sodium bicarbonate, as recommended by Wright for the treatment of gas gangrene, should form a valuable addition to large injections of a hypertonic saline mixture. The limited solubility of calcium bicarbonate makes it advisable to give the bicarbonate solution as a separate injection. Hogan and Fischer recommend the following formula for an alkaline hypertonic saline:

| | |
|---|---|
| Sodium chloride ... ... ... | 28 grams |
| Sodium carbonate (crystalline) ... ... | 20 ,, |
| Distilled water ... ... ... | 2 litres |

Bayliss recently drew attention to the importance of the factor of viscosity in solutions used to replace blood lost by haemorrhage. He considered that gum acacia was a suitable substance to add to saline for such purposes as imparting the requisite viscosity, and as being a colloid with a definite osmotic pressure. Hogan and Fischer, on different theoretical grounds, have recommended the addition of 2 per cent. of gelatine to a saline solution for intravenous infusion. It will be evident from what has been said above that the aim in treating shock should be to restore the volume of blood in effective circulation and at the same time to reduce the abnormal viscosity. While, therefore, a small addition of gum to the saline fluid used for injection may be valuable, the proportion of 7 per cent., suggested by Bayliss, as bringing the viscosity of the saline up to that of normal blood, would be unduly high. An addition of 2 or 3 per cent. of gum acacia to the saline solution above suggested might be tried; but it will be possible to make more definite recommendations when there has been time for experiment with solutions of different formulae.

The defective oxygenation of even the arterial blood, in experimental shock as above described, suggests that inhalations of oxygen may have some value in these conditions.

# MEDICINE IN MOROCCO.

BY

ARTHUR TACQUIN, M.D.,

BRUSSELS.

In the Middle Ages medicine, arts, and sciences had attained a high degree of splendour in Morocco. The town of Fez, capital of the empire, was considered to be the centre of civilization; the learned of the then known world met there to work in the great university, the library of which was renowned. It contained translations of the Greek authors, such as Galen, Hippocrates, Paul of Aegina, etc. Illustrious physicians such as Avenzoar (1161) and Averroes lectured there and were held in universal repute. Since then the sciences have remained stationary in Morocco, which has kept itself obstinately closed to all outside progress, so that the medicine of the natives is now only an echo of the medical art of the tenth century mingled with gross superstitious and other practices. At the great University of Fez which had thousands of students, no science, not even astronomy, held of old in such honour in the Mussulman world, is now taught. The only teaching is in theology, the interpretation of the Koran and Mussulman laws. Astrologers, soothsayers, and sorcerers teach the art of forecasting the future, casting horoscopes and seeking for buried treasure. The French Government would certainly do a useful work by raising from its ruins the celebrated University of Fez and establishing courses of lectures to be given by Algerian Arab professors. In this it would find a powerful means of civilization for the Moors, who still retain a great respect for the intellectual centre of Fez.

At the present day medicine is practised by native healers called *tabibs*, who are believed by the Moors to possess wonderful supernatural secrets for the cure of diseases, but they hold European doctors in high esteem. A certain number of these *tabibs* hold certificates and diplomas given to them at Fez by masters who have judged them to be sufficiently instructed. They then scatter through the country, going about from town to town, and installing themselves in the market place in tents, where they sit surrounded by strange drugs. Some of them have a little knowledge and can read, but the others are utterly ignorant. In general their treatment is harmless; there are some, however, bold enough to amputate, to do laparotomy, and to operate for cataract.

### *Minor Surgery.*

The native doctors practise bleeding and wet cupping apply sutures in haemorrhage, and open abscesses. In wounds of the intestine caused by the use of the knife they have recourse to a curious method of suture. The lips of the intestinal wound are pinched by an ant called *Agrab terbioun*, whose abdomen is then cut away, the mandibles remaining closed (*Agrab* in Walloon means a clasp or clip). The actual cautery and bleeding as well as cupping are held in great honour. The *tabibs* know the use of splints and starched bandages for fractures. The fragments are reduced and massage has been employed from time immemorial. Ruptures are kept up by means of very ingenious bandages. Lastly, they practise urethral catheterism and perform circumcision. Their knowledge of dentistry is summed up in the extraction of teeth and the application of dressings in cases of caries. The obstetric art is in the hands of ignorant and dirty midwives. They do not know the use of forceps or the vaginal syringe. They do not intervene in any case of abnormal presentation.

### *Principal Affections.*

The principal affections met with in Morocco are those commonly found in temperate regions; the diseases peculiar to the tropical zone are for the most part unknown. Cholera (*Coulira—Bau Guelib*) was unknown in Morocco before 1834. Since then there have been numerous epidemics, sometimes of terrible intensity; that of 1878, for instance, carried away nearly three millions of inhabitants. From remote antiquity Morocco has periodically been devastated by terrible epidemics of plague (*Bou Kebar—Taoun—Habouba* or *bubo*) which generally follow periods of famine. In 1237 cannibalism was practised. It was always from the East that the disease was imported, after pilgrimages to Mecca. The ravages among the people were great. In 1791 there died at Marakesh 50,000 out of 60,000 inhabitants, at Fez 55,000, at Rabat 20,000 out of 30,000, and in the other towns in the same proportion. In certain villages only four inhabitants were left out of 600. Terror reigned everywhere; the Arabs awaited death with the fatalism of Islam, and bought themselves grave clothes. Many of the towns of Morocco never recovered from this disaster; their ruins still exist. Typhus fever is always present endemically, giving rise periodically to epidemics. In the Morocco campaign the French troops suffered from the disease. Malaria is found to some extent throughout Morocco, in the towns of the coast, in the valleys, near marshes and stagnant waters (*Merdja*). Certain river valleys are uninhabitable, and the ruins of abandoned houses may be seen in them. Sporadic recrudescences occur, and the disease seems to have increased in intensity since the last wars with the French. Natives and Europeans are equally attacked.

Syphilis (*El Nouar—Meura—El-Kebir*) rages in Morocco, and it may be affirmed that most, if not all, Moors have, or have had, syphilis or come of syphilitic parents. They speak of it as if it were no more than having a cold.

Native prostitution is very widespread. Arab and Jewish public women are counted by the hundred in the smallest towns, and Spanish, French, and Algerian prostitutes swell the number. All the towns of the coast and the interior are frequented by troops of French singing women, who combine art with prostitution. New French brothels have been established in the principal towns, and clandestine prostitution grows daily more widespread, especially at Casablanca. Pederasty is a vice held in great honour among the Arabs. In the Moor syphilis seems to be attenuated, its manifestations being confined to the skin, the bones, and the eyes. Nervous phenomena are rare; it is exceptional to meet with tabes or general paralysis. This statement does not hold good for Europeans who contract syphilis from native women. The attenuated virus transported into a new and immune culture medium takes on an extremely active virulence, and manifests itself especially by nervous symptoms which rapidly become serious. Many European residents are attacked. Gonorrhoea is also very common among natives and Europeans. It is generally accompanied by complications involving the testicles, joints, and eyes. In European women metritis and salpingitis are very common.

Leprosy has been known in Morocco from remote antiquity. It has always been endemic there. Leper houses have always existed, and lepers were obliged to wear a special dress and to shake a clapper to warn the public of their presence. The number of stray dogs in Morocco is vast; most of them feed on carrion, and hydrophobia is frequent, even among Europeans. Fortunately, the Government has ordered hecatombs of dogs and has created a Pasteur Institute. Among the other diseases found in Morocco may be mentioned elephantiasis, itch, psoriasis, prurigo, small-pox, diphtheria, measles, tuberculosis in all its forms, gastro-intestinal affections pulmonary diseases, rheumatism, eye diseases, abscess of the liver, and affections of the kidney.

Mental disorders are very common. Mad folk are venerated. They are looked upon as possessing supernatural powers and are consulted in many circumstances. It is not uncommon in towns to meet with lunatics of both sexes completely naked, walking about the streets in perfect liberty and respected by every one. Only if dangerous are they shut up in filthy prisons, ill nourished, and without medical treatment.

Although the Koran strictly forbids Mussulmans the use of fermented drinks, the Moors addict themselves more and more to alcohol, and since the establishment of the Protectorate the example of the European tends to generalize the use of strong drinks throughout the country. In all the towns European cafés are multiplying. There the natives see foreigners at table on the terraces sipping the *apéritif* and various liqueurs new to them. The native Jews have always made wine and alcohol, and alcoholism has always been widespread among them. They extract alcohol from grapes, dates, and even from the Indian fig. A large quantity of spirits is also imported from Europe. The use of strong drinks is very widespread among the

higher classes of Moors. The Arab women passionately love alcohol. Cases of delirium tremens are frequent as a consequence of drinking impure alcohol mixed with aniseed. The evil consequences of these habits in a race already syphilized can readily be understood. It is therefore to be hoped that the French Government will do what is needed to check the development of this vice in its new colony.

The use of opium is very widespread. It is taken in the form of pills; it is also smoked with *kif* (cannabis indica). But the hypodermic syringe has already made its appearance in Morocco. The great majority of natives, including many women, are devoted to smoking Indian hemp, a habit which brings them to a state of utter brutishness. Means must be found to uproot this habit, which has a very bad effect on the mental condition of the natives. Before the coming of the French the Moors smoked tobacco very little; now the use of the cigarette tends to become general.

Premature impotence is common in the Arab as a result of the excesses to which polygamy leads; therefore the Moors make an immoderate use of all the known aphrodisiacs, and of the strongest condiments. The European doctors are pestered by impotent people who ask of them remedies to cure the affection which they call *El beurd*—that is to say, cold. The Germans have imported immense quantities of preparations, among which is *Johimbine*, which is found in the possession of most Arabs. The native doctors sell preparations which they declare to be of sovereign efficacy. Unknown to their husbands the women mix drugs with their food, and the effects on the health of the master are often serious.

### *Native Therapeutics.*

Native therapeutics rest on no scientific foundation. The substances chiefly used are senna, euphorbia, aloes, colocynth, ipecacuanha, croton, centaury, mint, lavender, thyme, saffron, cinnamon, ginger, aniseed, cumin, caraway, rue, camomile, gall-nut, castor oil, sarsaparilla, asafoetida, and rhubarb. Among substances belonging to the mineral kingdom may be mentioned alum, corrosive sublimate, mercury, copper sulphate, sal-ammoniac, nitre, arsenic, petrol, sea-salt, oxide of iron, etc. All these substances are used in the manufacture of complicated formulae, the origin of which goes back to the night of time—old recipes transmitted from generation to generation.

Organotherapy plays a large part in native therapeutics. Thus they employ the suprarenal bodies in the treatment of certain eye diseases. Bates of New York has obtained good results with suprarenal extract in the treatment of kerato-conjunctivitis and episcleritis. They treat hydrophobia by making the patient eat the liver of the rabid animal. The Aïssaouas, in order to make themselves immune against the bite of poisonous serpents, swallow the venom and devour the reptiles raw. The researches of Calmette on snake poison are well known. Extracts of testicle are used in the treatment of impotence; it is the theory of Brown-Séquard. It is clear that these methods of organic therapeutics come from the school of ancient Greece, Hippocrates, and other old physicians. Among the organs most employed may be mentioned the liver, the heart, the lung, the spleen, osseous tissue, bone marrow, fat, hair of the head and other parts, testicle, ovary, penis, ova. These organs are taken from many animals—horse, cow, sheep, dog, goat, gazelle, hyena, hedgehog, snake, cock, boar, scorpion, pig, frog, swallow, mouse, etc. Human fat is much sought after. Among secretions used are: Urine, milk, bile, faeces, semen, virgin's saliva, menstrual blood, biliary and vesical calculi. When a man wishes to excite love in a woman he gives her without her knowledge his semen mixed with sugar to drink. When a woman wishes to make herself loved by a man she mixes with his food love philtres made by sorcerers or healers who draw a good revenue from them. Poisoning is frequent in Morocco. Arsenic is much used; it is the cup of "bad coffee." This is why when an Arab offers tea to his friends he prepares it before them and drinks the first cup himself.

Without knowing it, the Arab physicians often practise antisepsis when they use hot tar, boiling oil, resin, henna, copper sulphate, salt, etc. On the one hand, suppuration is rare in the Arab, and on the other the sun is the great antiseptic.

There are numerous mineral springs in Morocco; some were known in the time of the Romans, and the Arabs still make large use of them.

When the *tabibs* wish to perform a serious operation they give their patient hyoscyamus. Thieves also mix this with the food of their victims before robbing them. The native doctors also employ nutmeg—in circumcision, for instance. Lastly, the anaesthetic effect of hypnosis is well known.

In addition to all these remedies, there is a therapeutic arsenal of religious character—incantations, magic spells, prayers, talismans, amulets, verses of the Koran, magical objects, precious stones, rings, strings of beads, earth from Mecca, water from the Agar well, etc. Finally, there are the innumerable marabouts, dead or living, whose influence is regarded as sovereign for the cure of disease. There are numberless tombs of saints to which sick folk go to invoke the shade of the dead man. These mausoleums are often covered with ex-votos. There are also old sacred trees, stones, and even old guns, which are credited with the power of curing certain diseases. The Arab women frequently make pilgrimages, sometimes in search of a cure for illness, sometimes of a remedy for barrenness which is generally due to the impotence of the husband. The prayer of these women is often answered, as the pilgrimage is a pretext for passing several days in the company of a lover.

### *Hygiene.*

The Arab has his own notion of hygiene, which is usually the opposite of ours. In his home he is much cleaner than the native Jew, whose filthiness is inconceivable. Most Arab towns are provided with drains and systems of water supply, but their condition is deplorable. All the dejecta and decomposing refuse remain in the obstructed drains where there is no fall of water. The drinking water conduits are open, and in many places women are seen washing their linen and men making their ablutions in them. The fountains used in common by beasts and human beings are polluted; the street waters run into the wells, while the liquid matters from the drains reach them by infiltration. All the springs in the interior are polluted. The women do their washing in the spring itself; sheepskins are washed in it, and the people who dwell down stream drink this contaminated water. Filth lies everywhere about the streets and accumulates in enormous heaps at the gates of towns, rising higher than the embattled walls; on the foul charnel heaps the bodies of horses, cows, mules, and other animals rot, and dogs and flies dispute the remains. The charnel heap of Fez was a nameless horror. I have seen domestic animals still alive among the fleshless carcasses, for the Arab leads his dying beast there in order not to have to carry its dead body. Millions of flies, after sucking the infected juices from the dead bodies, scatter themselves about the town, where they swarm over foodstuffs exposed for sale and invade the houses. The Sultan when he goes out is accompanied by official fly-hunters, who keep on shaking cloths to protect the face of the august emperor.

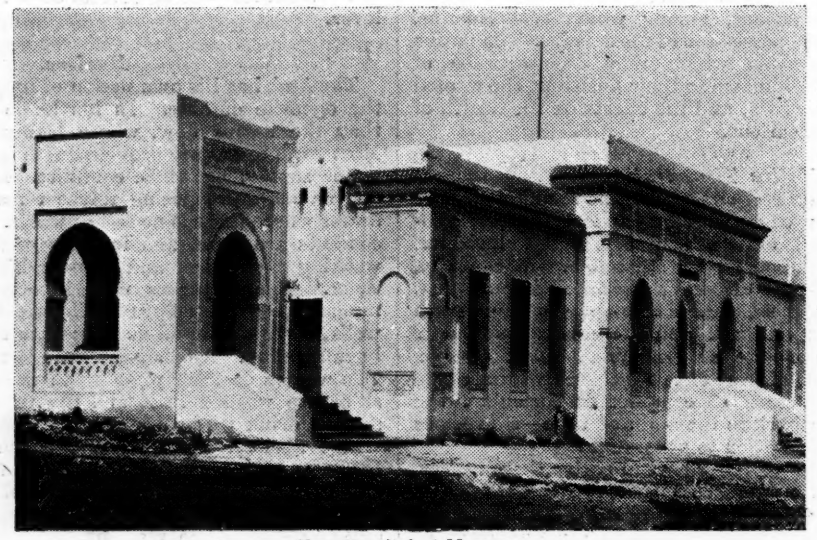
To sum up: the towns of Morocco are in general hotbeds of pestilence, their soil from time immemorial having been impregnated with all kinds of dejecta. The streets are narrow and winding, airless, crowded with people. In winter they are sewers, along which one can only go on horseback; in summer whirlwinds of dust arise to such an extent that at Marakesh, in the month of August, I have seen that dust as thick as a London fog. Moreover, the towns of Morocco are surrounded by high walls, which prevent the aëration of the streets. In short, these towns are uninhabitable by Europeans, and the French have built outside the towns superb dwellings, which are very healthy, and they have even constructed new towns, as at Marakesh.

The consuls and foreign settlers in Morocco have at all times made every effort to induce the Moorish authorities to take steps to remedy their sanitary conditions. In 1792 the consuls formed the *Junta de los consules* (Consular committee) at Tangier, which was the origin of the "maritime health council." The consuls were charged by the Sultan "to see to the safeguarding of the public health along the shore, and to take all steps to secure that object." The initiative of the consuls was, however, continually hampered by the ill-will or inertia of the

Moorish administrations. It marked some degree of progress for the coast towns, but the influence of the consuls did not make itself felt in the interior of the country, where the towns continued to be nameless sinks.

With the establishment of the French power in Morocco radical measures were at last applied. But the task was gigantic. On the one hand the French authorities have to struggle against ancient customs and prejudices and against the ill-will of the natives; local interests and susceptibilities had to be considered, and action taken gently and tactfully, for ancient customs could not be upset in a few days. There was, besides, religious sentiment to be considered and Mussulman fatalism to be fought against, for the native is convinced that all the epidemics and diseases which attack mankind are a manifestation of the will of Allah. Hence they are inclined to believe that measures of prophylaxis are opposed to the decrees of the Almighty.

In spite of all these difficulties the French authorities have already achieved immense progress, and, notwithstanding the war, important sanitation works are being pushed on with energy. Systems of drainage and water supply have been established in most of the towns; they are still defective, but the defects will be remedied. It has been necessary everywhere to remove enormous heaps of filth and to prevent the inhabitants from throwing their refuse into the street. Wide avenues have been opened in overcrowded and unhealthy quarters; squares, public gardens, and parks have been made and public fountains erected. The Jewish quarters have been as far as possible made sanitary. True European towns have been built outside the walls, as at Casablanca, Rabat, Marakesh, where the Guelliz quarter will prove a great development. New towns, completely European, such as Kenitra, have been founded. Improvement of ports is actively pushed on; a network of superb roads is in course of completion for use until railways are constructed. Fine public buildings, schools, hospitals, barracks, lazarettos, etc., are being built in all the towns. In short, under the impulse of French civilization Morocco is daily becoming transformed and metamorphosed to such a degree that travellers who return there after a long absence are startled, and in many places find themselves in a strange land.



New Hospital at Mazagan.

The scheme drawn up by the Protectorate Government is vast and well thought out. There is a "service of health and public assistance" with the following functions: Native assistance, general hygiene and prophylaxis, communal sanitary services, visitation of prisons and dispensaries for prostitutes, inspection of schools, judicial requisitions, future organization of the maritime sanitary service, special sanitary missions, assistance for Europeans in general. The "mobile medical formations" will undoubtedly render great service. The personnel of each consists of one or two doctors, two male nurses, and three drivers; and it is provided with six mules, one tent for consultations, one tent for the personnel, four panniers for medicines, six draw sheets, one dressing case, a miscellaneous assortment of drugs, three *chouaris* (large panniers carried by beasts of burden), six sets of harness. There is a centre at Rabat for the manufacture of antivariolous vaccine. There is also a Pasteur Institute for the treatment of persons attacked by hydrophobia.

The medical service of Morocco has decided on the creation of hospitals, lazarettos, isolation camps, shops for the supply of material and drugs, research laboratories, and lunatic asylums. There are already in most of the towns hospitals and medical dispensaries where natives receive gratuitous treatment. The hospital of Mazagan is a superb building, though it has defects from the practical medical point of view, since the architect's main idea seems to have been to erect a fine building. It would have been better to have built further outside the town, on the height overlooking the sea. Many indispensable things are still lacking, such as a radiographic apparatus, a completely equipped operating theatre, etc., and it is to be hoped that after the war the money necessary will be provided.

The native hospitals or dispensaries which exist in most of the towns of Morocco, principally on the coast, render invaluable service in the prophylaxis of syphilitic affections. In particular the numerous prostitutes who have now been placed under the supervision of the police are examined and treated there. Several of these dispensaries have medical women attached to the establishment. All natives who present themselves for consultation are treated.

The native hospital of Mogador is a model of its kind, and it has the merit of having been created with scanty means. The Arabs are fatalists, and to induce them to go into a hospital founded by "Christian dogs" it is necessary that they should receive a special welcome from persons who thoroughly understand their mentality and know their customs and particularly their language. The part of the head doctor is all-important and decides the reputation of the hospital among the Arabs. Dr. Bouveret, head of the Mogador hospital, speaks not only Arabic but the special dialect of the hillmen of the Atlas. He has succeeded in winning their confidence, and they come to the dispensary in large numbers, some of them from places many days' journey away. On admission the patient is bathed and disinfected; he is given clean clothes and is placed in an irreproachable bed, which is a novelty for him. He is taken care of by trained nurses, is supplied with abundant food, and accustomed as he is to the indifference and roughness of his co-religionists, finds all his needs gratuitously attended to. All diseases are treated at the dispensary and minor surgery is practised. It is particularly in antivenereal prophylaxis, which has to be carried out without delay, that the work of Dr. Bouveret is important, for he has been able without compulsion, which is always avoided, to induce prostitutes not only to submit themselves willingly to examination, but also to attend daily for an antiseptic vaginal injection. The happy effects of this rational treatment were soon seen among the men of the military garrison, where cases of syphilis have almost disappeared. When a woman is infected she is kept at the hospital and treated by the most modern methods. The very encouraging results obtained by Dr. Bouveret make enlargement of the hospital buildings necessary. The equipment needs to be considerably improved; there are also wanting indispensable things, such as a radiographic apparatus, a microscope, surgical instruments, operating table, etc.

Every day the Moorish natives feel more confidence in European methods of treatment, and when they have placed their trust in a doctor they never change. Therefore it is most necessary that the French authorities

should understand that the transference of doctors from one town to another when they were well known by a whole native *clientèle* greatly annoys patients. These moves, which are for the most part quite unnecessary, are calculated to hinder the spread of European medicine among the natives.

To sum up: The French Protectorate in Morocco has already made great progress in the sanitation of the new French colony, but much still remains to be done. It is quite competent to accomplish the considerable task which will be its work "after the war."

## ON THE ORIGIN OF ELECTRIC CURRENTS LED OFF FROM THE HUMAN BODY, ESPECIALLY IN RELATION TO "NERVE-LEAKS."

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During the last two or three years certain theories propounded by Mr. Arthur E. Baines have received considerable attention, and have been applied in practice by a number of medical men who have accepted these views. I propose to examine the scientific basis on which they are founded.

The basis of the system lies in the fact that, by leading off from different points of the body by means of silver electrodes, currents of various degrees of magnitude can be detected when the electrodes are connected to a very sensitive galvanometer of high resistance. In a case of shell shock, for example, a particular area of skin may give a large deflection compared with that normally obtained by holding the electrodes in the hands. This is called a "nerve-leak," and is interpreted as an escape of "neuro-electricity," or "nerve energy," from a place where the insulation of the nerve fibres has broken down, similarly to what happens in a submarine telegraph cable.

In the first place, we must remember that the animal body does not contain any metallic conductors; the conduction of an electric current is of a different kind from that in a wire. We must examine therefore the possible sources of potential difference, giving rise to currents, in such methods as those used by Mr. Baines.

The human body is a system of solids and liquids intermixed. The solids are, when dry, non-conductors, but become conductors when soaked with the solutions in which they are immersed. These liquids contain salts, and it is by means of the salts that the current is conveyed. Hence they were called by Faraday "electrolytes."

How is this done? When salts are dissolved in water they are split up into two or more atoms or molecular groups which have electrical charges of opposite sign. These products of dissociation are known as "ions," and the unit electrical charge carried by an ion is called an "electron." Electrons do not exist in such solutions free from the chemical atoms with which they are combined. In Mr. Baines's book, *Electropathology*, ions and electrons are said to be identical, and this fundamental error runs through the whole theory. Ions and not electrons are the source of electrical differences in the body and serve as the only means of conduction of electrical currents. This they do by their actual movement, conveying electricity much as a horse and cart carries stones. Being actual material existences and non volatile, they do not escape from the surface of the body to the air; as we are told that "nerve-leaks" do. Mr. Baines holds that electrolytic dissociation of salts in water is accompanied by an actual disintegration of the atoms themselves, by which free electrons are formed, as in the case of radium. No proof has ever been given that the salts actually present in the body do this. If it were so, the astonishing equivalence between the amount of energy supplied as food and that given out in various forms by the organism would not be obtained experimentally. This fact is one of the most significant results of modern physiology.

The body therefore is full of ions, but not of free electrons, and any explanation of electrical differences must be on this basis.

As a first step, let us see what happens when two places on the surface of such a moist conductor as the body is are led off by silver electrodes. We will suppose that the two places are at the same potential, and this is most easily obtained experimentally by taking a dilute solution of sodium chloride and immersing the electrodes in it. Now, unless the two electrodes are not only of the same metal, but also have their surfaces in precisely the same physical and chemical state, there will be found to be a potential difference between them. The exact origin of this potential difference would take too long to explain, and it is a somewhat difficult question, depending on the tendency of the ions of the electrode to pass into the solution or those of the solution to pass into the electrode; but in practice I have found it impossible to get two silver electrodes which are equipotential in salt solutions. I have taken the greatest care and spent much time in the attempt, but have never obtained less than 0.006 volt. This potential difference would give, with Mr. Baines's galvanometer through the ordinary dry skin, a deflection of just about the order of that regarded by him as the normal hand-to-hand effect. Since the deflection obtained by the use of such electrodes on the skin depends on the resistance of the circuit, if one of them be moved to a place where the skin is moist the deflection will be greater, and the greater deflection indicates no more than that the resistance is less. This is the first kind of "nerve-leak," and I would emphasize the fact that no test of the equipotentiality of the electrodes is made in Mr. Baines's practice. In any normal person it is quite easy to find areas where the skin is moist and to compare these with drier places, and it is an omission that so few tests for "nerve-leaks" have been made in normal cases.

The simple state of affairs just described, although always present, is, however, not the whole story. Since the source here is in the electrodes, it is plain that if they are reversed in position, so that the one previously on the right hand is changed to the left hand, and vice versa, the direction of the galvanometer deflection is unchanged, whereas if the galvanometer connexions are changed, without altering the position in the hands, the direction is reversed. This, indeed, is usually the case, but not always. In the latter case it is clear that there must be a source of potential difference in the skin itself, which overpowers that of the electrodes. This can only be investigated by the use of electrodes which do not themselves produce a potential difference when in contact with the skin; in other words, the so-called non polarizable electrodes must be used. The contact with the skin is made by a salt solution similar to that of the tissues themselves. It is familiar to all physical chemists that such phenomena as those with which we are concerned can only be investigated by the use of such electrodes, but it is unnecessary to describe here the details of their construction. For the present purpose their more important property is that they can be made equipotential, or rather the one electrode has a potential exactly equal and opposite to that of the other, so that in use they give rise to no current. Mr. Baines gives a series of extraordinary objections to their use, based on his view of the importance of static charges and inductive capacity in phenomena of electro-physiology. I shall have occasion to discuss this point presently, and will merely refer here to the instructive photographs taken by Dr. Thomas Lewis with the string galvanometer, showing the distortions produced by metallic electrodes. They were published in the Proceedings of the Physiological Society in the *Journal of Physiology*, vol. 49, p. li.

The most obvious source of electrical changes in the skin is the activity of the sweat glands, long known to be accompanied by such effects. Moreover, Tarchanoff showed that all kinds of mental states produced localized activities of these glands. Shell shock and neurasthenic states are undoubtedly conditions of mental instability and easily induce activity of sweat glands. There may be also other sources of electrical changes in the skin in addition to this.

The explanation of electrical changes in cells is beyond the limit of this article; the most acceptable view is that they are due to the separation of the positive from the negative ions by the interposition of a membrane through which only one kind of the ions is able to pass. Thus we have a Helmholtz "double-layer," which can be best realized by the comparison of a field containing ewes and

lambs separated from another field by a fence through which only the lambs can pass. Just as the attraction between oppositely charged ions prevents either from leaving the membrane to any great distance, so the attraction of food and parental care prevents both the ewes and the lambs from wandering very far from each other, although on one side of the fence the lambs will be in the majority, on the other side the ewes.

At one time I was inclined to think that these areas of localized sweating might be connected in some way with Head's areas of referred pain, but further investigation showed that it was impossible to refer them to any definite lesions in the nerve centres.

We have, in any case, another kind of "nerve-leak" of a more distinctly physiological origin. It is, when metallic electrodes are used, associated with the first kind, and the result on the galvanometer is the algebraical sum of the two together. Without any further hypothesis, they are capable of accounting for all the results. But Mr. Baines holds that these results are to be explained by static charges and "inductive capacity." I have made numerous attempts to detect the production of currents by giving charges to insulated bodies connected by electrodes to the galvanometer and have failed altogether. Indeed, since the points led off must be equipotential whatever the magnitude of the charge given, it is difficult to see how currents could be produced. The charge, as Faraday showed, is situated on the surface and cannot affect processes going on in the interior of the body tissues. Static charge may, I hold, be rejected. What about "inductive capacity"? I found some difficulty in discovering how Mr. Baines imagines this to play a part. But, ultimately, it turned out to be this: The galvanometer deflection obtained from a patient is found to be very sensitive to the passing of electric trains, but, instead of looking for the cause in action upon the magnetic system, Mr. Baines attributes the deflection to currents induced in the human body which are being led off. This seems almost inconceivable in a skilled electrician, but no other evidence is given.

In Mr. Baines's theories there is a flow of what he calls "neuro-electricity" along nerves. This is stated to be a kind of ordinary electricity, so nearly the same that it passes as such around the coils of the galvanometer. If this be so, nerves, when cut and the ends placed in contact and insulated from the exterior, should conduct impulses, not of course giving rise to co-ordinate movements, but to movements of some kind. In point of fact, they do not, as is common knowledge. The source of this "neuro-electricity" is supposed to be the brain and by atomic disintegration. No proof of any kind is given, and, whatever may be the nature of the nerve impulse, it is certain that there is no continuous stream of energy, and all that we know points to its being connected with the concentration of certain ions at membranes.

I pass on to the method of treatment founded on the theory of neuro-electricity. This is the application of "dielectric oil," or similar preparation, which are supposed to act as insulators and thus stop the leaks. Not only are the nerve-leaks of shell shock cured, but also all inflammatory states, such as pneumonia and so forth. All living cells are stated to lose their "vitality" if deprived of their supply of nerve energy. That this is incorrect is shown in a striking way by the experiments of Clara Jacobson, who showed that wounds in a denervated limb heal quite as rapidly as those in a normal limb.

What is this "dielectric oil"? It is merely a good specimen of ordinary liquid paraffin; in fact, its insulating properties are rather inferior to those of a preparation which I obtained from Messrs. Hopkin and Williams. I have made a detailed investigation of the chemical and physical properties of various paraffins, but was unable to find any possessed by the "dielectric oil" beyond those of other commercial samples. More especially it is easy to show that it does not penetrate the skin. If it did so, the electrical resistance would rise. The electrical resistance does not change. Further, the dielectric oil loses the greater part of its insulating power by contact with salt solutions, as it must be in the skin and tissues.

There is no doubt that liquid paraffin is a pleasant dressing for raw wounds; it is protective, and to some extent excludes infection by micro-organisms. But it has no effect on the results of general infection.

In the attempt to explain the curative results obtained, apart from those obviously due to suggestion, it is necessary to bear in mind the great difficulty of avoiding the fallacy of concluding that a phenomenon which follows another in time is the direct result of the former one. Thus, when the temperature in pneumonia falls after the application of "dielectric" to the front of the chest, how do we know that the temperature would not have fallen without the dielectric? In any case, I cannot accept it as a proof of penetration *through* the chest that the bedclothes beneath the patient were found soaked with paraffin three hours after its application to the front of the chest. It is rather remarkable that, in Mr. Baines's list of the important properties of his "dielectric," that of low surface tension is omitted.

In conclusion, I might say that it would be unjust to blame those medical men who have adopted the theories of Mr. Baines. They deal with a very complex branch of physiological science, although it is not so complex as Mr. Baines would have it.

The net results of my investigations may be summed up thus:

1. Currents led off from various parts of the body by metallic electrodes are due to inequalities in the electrodes, together with differences in the activity of the skin glands.
2. Neither static charges nor induction plays any part.
3. "Nerve-leaks" are merely places where the skin is moist, and they give no indication of lesions in the nerve centres.
4. The view that "neuro-electricity" is generated in the brain and escapes from nerves owing to breakdown of insulation is devoid of evidence and contrary to the knowledge we possess of physiological processes.
5. My examination of Baines's "dielectric oil" leads me to conclude that it is ordinary liquid paraffin; that it does not pass through the skin and cannot reach any nerve or other internal tissue.
6. Treatment of open wounds by liquid paraffin has some justification in excluding air and perhaps bacterial infection. But it is not new. The results obtained have no relation to insulating properties, and the "dielectric" has no superiority in this respect over commercial samples.

# OPERATIVE TREATMENT OF INJURY OF THE PERIPHERAL NERVES.

BY

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TYPICAL points of doubt and difficulty that present themselves to the surgeon in the treatment of cases of nerve injury may be grouped under the following heads: I, How soon after the reception of the nerve injury should an operation be performed? II, What are the indications for operation as derived from the study of the signs and symptoms? III, Points of difficulty and doubt as regards correct or best procedure and technique arising during the actual operation.

## I.—THE INDICATIONS IN TIME FOR OPERATION.

All wounds caused by present-day projectiles, even those produced by rifle and machine-gun bullets that enter and emerge through tiny skin punctures, must be regarded as infected. The complication of a nerve injury by sepsis, or the involvement of a nerve trunk in a septic inflammatory process, appears to be fatal to that regeneration of nerve fibres which leads to and is the indispensable basis of the re-establishment of conductivity in the segment of the injured nerve and distal to it that clinically we designate "recovery." Neither the reason for this nor its pathological basis is far to seek; nowadays, when so many damaged nerves are being operated on, the former is again and again made clear by, and the latter exemplified in, the excessive production of scar tissue by the infective inflammatory process. This excess of scar tissue, with the different position or positions in which it finds itself produced, seems to act in different ways towards its one unfortunate end. These are as follows:

1. Scar tissue formed between the ends of a completely or incompletely anatomically divided nerve which have

retracted a variable distance, in this position acting effectively in preventing regeneration.

2. Scar tissue between the fibres or bundles of fibres of the nerve trunk, producing the typical spindle-shaped swellings of a localized interstitial neuritis. Here it may be the result of the organization of blood effused at the time of injury. This usually occurs in one or both of the ends of an anatomically divided nerve as well as in a damaged segment of a physiologically complete or incomplete lesion; or it may be the result of a slower and more gradual irritation and inflammation of the affected segment of the nerve.

3. When a segment has been more severely damaged by a projectile than a mere bruising, and yet not completely cut through, we may find the fibres and nervous structure of part or whole of its cross section replaced by scar tissue—complete or incomplete fibrosis of the nerve. At operation this part appears more opaque and of a smaller circumference, feels harder to the finger, and cuts harder to the knife than does normal nerve.

4. Scar tissue, whether organized blood clot, callus, or the usual fibrous product of infective inflammation, is very frequently found in considerable masses surrounding a segment of nerve. This affected portion itself may be the seat of no gross or macroscopic lesion except that in many cases the fibres will be degenerated. Indeed, it is often surprising how cleanly in the end it dissects out of such a mass. This scar tissue, either directly or possibly by interfering with the nutrition of the fibres, blocks conduction, often causes degeneration, and interferes with regeneration.

5. In some cases extraneural scar tissue is present not in the form of masses or bands from which the nerve dissects free, but in the form of perineural adhesions, strands of scar tissue which blend indissolubly with the perineurium. This seems to be the result of a septic cellulitis in the intermuscular plane in which the nerve lies. Such adhesions are often very numerous, extend over a considerable length of the nerve, and very effectively prevent, or at least render difficult, the process of nerve-stretching. In two cases, the most extreme instances of this form of perineuritis that the writer has noticed, the nerve itself having been cut through by a piece of shell, was in a state of subsiding acute inflammation—smaller in diameter than usual, red and congested, and with little trace of nerve bundles for a considerable distance up and down from the original lesion. Probably in these cases an acute septic neuritis, spreading up and down from the point of division, had accompanied the extraneural cellulitis. In another case the condition of perineural adhesions was complicated by complete fibrosis of the nerve, the posterior interosseous, well down to its point of distribution of motor fibres and up to and including the lower part of the musculo-spiral. Probably, also, this was the late result of such an acute spreading neuritis as we have just described. Probably, also, this combination of destructive fibrosis over a considerable length with extensive adhesions is the final pathological outcome in cases where sepsis follows an operation of resection and suture.

In most cases there is present a combination of several of these pathological conditions described. Any operation, then, on an injured nerve which is carried out through already infected tissues will only spread such mischievous processes up and down—up to what is normal and healthy nerve, and down to what is healthy though degenerated. Hence it becomes axiomatic that no operation should be performed on the nerve for the relief of paralysis, etc., in the presence in the tissues of micro-organisms. Even where the divided nerve presents itself in an open wound or is found during the course of an operation with other objective, steps taken to do more than suture temporarily the ends to prevent further retraction or remove any foreign body or piece of bone, etc., actually pressing on the nerve are contraindicated and unjustifiable.

How long, then, after the sound healing of the wound and disappearance of all scabs is it necessary that one should wait? It is well recognized that the mere healing of a wound gives no very dependable assurance, at any rate for some time, that micro-organisms are not latent in the tissues; especially is this true as regards the healing, which is often temporary, of sinuses due to the presence of foreign bodies or to caries and necrosis of bone. On the other hand, it is generally admitted that secondary suture of nerves should be carried out as soon as possible, and that the interval that elapses before it is performed has definite importance as regards the degree of success that may be expected as the result of the operation.

The question is one of considerable practical difficulty; it would seem that one must compromise between the two opposing desirables; but one may fairly safely conclude that there should be observed some definite relation between the "period of probation" of the healed wound considered desirable and decided on in each case, and (1) the depth and extent of the original wound, (2) the nature of the projectile that caused it, (3) the amount and character of the suppuration that ensued, (4) the length of the period of healing, (5) the presence in the tissues of further foreign bodies during this period, (6) the presence or absence originally of bony injury, necrosis, or caries.

There are very many cases of nerve injury where healing is almost indefinitely delayed and its period prolonged owing to original bony injury and infection—extensive or deep necrosis of bone, large cavities in bone, tunnels through bone with walls of necrosed or carious bone lined with septic granulations. In most of these direct operative interference for the cure of the nerve injury—unless this can be performed aseptically at a very safe distance—has to remain in abeyance for long periods, but treatment should be adopted as early as possible and made as radical as possible and as bold as is necessary for an early and rapid elimination of that factor in the injury which is responsible for the persistence of the suppurating track.

## II.—THE INDICATIONS FOR OPERATION FROM CLINICAL SIGNS AND SYMPTOMS.

### Complete Division.

Clinically, complete division may be either anatomical or physiological. This, however, is a difference that is not in the majority of cases diagnosable before operation. In some few cases—

(*a*) Where a previously recognized incomplete lesion has become clinically complete in the course of time;

(*b*) Where the clinical picture of "completeness" is associated with a palpable spindle, for example, in the case of the ulnar nerve behind the internal humeral condyle and where one can feel subcutaneously continuity between the spindle and the nerve trunk above and below;

(*c*) Where from the history of previous shooting pains or paraesthesiae which now have ceased—signs of incomplete division—one can deduce that the lesion has not been complete from the beginning;

(*d*) Where the track of the projectile is near, but obviously does not cross the path of the nerve—

the diagnosis of a physiologically complete division is possible. Although in the case of injury to the larger nerve trunks that fall into the groups (*a*) and (*c*) the condition may have been one of an imperfect or partial anatomical division, with a further later development of complete physiological division of the remaining anatomically intact part of the nerve trunk. In most cases, however, the diagnosis of complete physiological division cannot be carried so far.

How, then, should one treat a case presenting the picture of complete division, whether anatomical or physiological being unknown? If the lesion be an anatomical one, obviously the chance of spontaneous recovery is, to say the least, of the slenderest, if at all existent.

From a consideration of these points we would suggest, as a general guide, the following rules for the treatment of complete lesions.

#### *When it is Not Known whether the Lesion be Anatomical or Physiological.*

If it be unknown whether the lesion be anatomical or physiological, if there has been no sign of its becoming incomplete up to the end of the period of healing of the wound and of a further reasonable period of probation of the healed wound, operation should not be delayed, for one cannot be certain that the lesion is not anatomic, and if it be physiological, the lesion must be one in which spontaneous regression to recovery is unlikely.

#### *When it is Known that the Lesion is Physiological.*

If it be known that the lesion is physiological—that is, in all cases falling into groups (*a*), (*b*), (*c*), (*d*)—again operation should not be delayed beyond the periods of healing and probation, if during those periods the signs have not

regressed to clinical incompleteness; for in these cases what pathological conditions are conceivable that will, in their evil effects on regeneration and conductivity, be anything but stationary or progressive?

INCOMPLETE DIVISION.

Operative interference may be necessary and indicated in such cases for one or more of the following causes:

1. Where an incomplete lesion remains stationary after the wound has healed soundly and the disability remaining is serious or severe. Here, again, it would seem to be advisable to operate as early as possible for fear the lesion, incomplete though it be, is one in which there can be no chance of spontaneous regression and recovery.

2. Where an incomplete lesion is increasing in the severity of its clinical signs and the disability is serious from the beginning or becoming so.

3. Where after a nerve has recovered up to a certain point some serious disability remains.

The disability in these cases may be—

(*a*) *Motor.*—Paralysis of important muscles.

(*b*) *Sensory.*—Extensive protopathic loss in the foot or hand; extensive epicritic loss in the hand of a skilled manual worker.

In all these cases operation is all the more indicated, inasmuch as it is impossible to foretell the pathological condition present; it may be combined anatomic and physiological division, or severe fibrosis of a portion of the cross section of a nerve.

4. Because of persistent pain—for example, in causalgia—to give the patient relief; or for persistent hyperaesthesia or hyperalgesia which is severe and troublesome.

## III.—DIFFICULTIES IN OPERATIVE TECHNIQUE AND PROCEDURE.

The chief objects to be aimed at in order to ensure an operation resulting in as complete a regeneration as possible—complete functional recovery depends as much on post-operative treatment as on operative—may be summed up as follows:

1. (*a*) Where the division is physiological, by the removal of such agents—for example, scar tissue—as are preventing physiological connexion or regeneration of fibres;

(*b*) Where the division is anatomical, by the procuring of sound physiological connexion between the two ends, by means of which normal fibres of the proximal end may grow into and along the paths of the degenerated fibres of the distal;

(*c*) Where the length of hopelessly damaged or destroyed nerve trunk is great, possibly by the procuring of physiological connexion between the degenerated paths of the distal end and the normal fibres of some neighbouring or conveniently situated nerve—

the object may be attained of laying the basis for regeneration and recovery of conductivity in the nerve trunk distal to the lesion.

2. The protection of the suture line from fibrous ingrowth and of the exposed length of the nerve from being surrounded by a further permanent mass of contracting or adherent scar tissue. This includes, of course, the observance of the most rigorous asepsis during the operation, and requires healing of the operation wound by first intention; and haemostasis as absolute as possible before closing the wound, as a collection of blood clot round or near the nerve not only constitutes an invitation to sepsis but is destined to become organized into fibrous tissue.

3. No further damage should be inflicted on the nerve by rough handling.

These conditions of success apply to all cases; the surgical methods of fulfilling them necessarily vary with the pathological and anatomical conditions of different cases, and in fulfilling them questions of doubt and difficulty arise in the case of all three.

### 1. THE PRODUCTION OF A BASIS OF PHYSIOLOGICAL CONNEXION FOR REGENERATION AND THE RE-ESTABLISHMENT OF CONDUCTIVITY.

#### A.—*Where the Division is Clinically Complete.*

1. Where the division is anatomical.

The two ends will be found usually considerably apart and surrounded by more or less scar tissue. The upper end is always bulbous to a greater or less extent; the lower often but not always so.

To cut down on the obvious point of injury of a nerve and expect so to find it is always, and especially in cases of anatomic division, to prolong the operation. It is best always to find normal, or at any rate recognizable, nerve trunk above and trace it toward its entrance into scar tissue; then similarly recognizable nerve below, and trace it upwards; and finally to dissect out the ends or intervening more damaged portion and ascertain the exact nature of the injury and the exact condition of the ends or damaged segment.

It is necessary, or at least very desirable, to excise bulbous ends, unless the spindles are slight, arguing a relatively small amount of interstitial fibrous tissue. These bulbous ends are usually in a condition of severe interstitial neuritis, and their fibres, even of the proximal end, "compressed from within," degenerated, if not many actually destroyed beyond hope of regeneration. It should be made a rule, then, as regards the proximal end, to pare it with a sharp scalpel until the fibres appear in white and definite bundles with no abnormal amount of cellular tissues between; in some cases, however, where the nerve immediately above the spindle or directly damaged and fibrosed segment has been caused to degenerate without the occurrence of interstitial fibrosis by such a removable pathological agent as bands or masses of scar tissue, it will be necessary to carry the section of the nerve no higher than such a point as shows degenerated bundles without interstitial scar tissue. When there is present a spindle on the distal end, it too, if at all marked, should be excised; in all cases this end should be cut until the bundles show definitely, consisting of degenerated fibres—which bundles are always more swollen, more transparent than are normal undegenerated ones, and of a curious bluish-grey "glassy" appearance. Of course the resection should be as conservative as possible and as is consistent with the getting ground for a good physiological connexion between the fibres of the two ends; at the same time, if not performed boldly enough and scar tissue or part of a partially or completely fibrous spindle left at either end, the chance of the occurrence of regeneration will be slight, if not altogether destroyed.

It is best to stretch a nerve to the maximum amount probably needed or desirable before the removal of the spindles; not only does the spindle give one a good hold of the nerve for this process, but any bruising or damage sustained by it during the stretching is immaterial because of its subsequent resection.

2. Where the division is physiological and the pathological condition one of interstitial fibrosis, the nerve being swollen or spindle-shaped in the affected area.

Here, again, probably the best chance will be given if the nerve is first stretched and the spindle excised until the upper cut end shows normal and the lower a degenerated but otherwise normal cross-section. It may be argued that regeneration and recovery might occur without this, but here the argument in favour of resection is similar to that raised in considering the question of operation in cases of palpable spindle with signs of complete lesion.

3. Where the division is physiological, the pathological condition being one of complete fibrosis of a whole segment of the nerve trunk.

In this case of course there can be no question as to the necessity, after nerve-stretching, of resection of the whole injured segment and of as much above and below the obvious gross limits of the fibrosis as is sufficient to show the appearances of the cross-section described as essential.

4. Where the division is physiological and due to strangulation by or involvement in scar tissue, callus, etc.

Freeing the nerve from all strangulating and tight bands or masses will be sufficient, provided that these be the only cause present of degeneration or failure of conductivity. This should be done most carefully all round the nerve and along as great a length as is affected even in the slightest degree. Some surgeons advise the injection of novocain and adrenalin into the nerve trunk in order, by causing the nerve to swell, to make more evident bands which might otherwise escape notice.

When the nerve is quite freed, careful examination both by sight and feeling should be made for the detection of any area or segment of fibrosis in the nerve itself. If when the nerve be freed a spindle be found, at once difficulties arise. Was the failure of conduction due to the extraneural or to the intraneural fibrous tissue, or to both? If to both, will freeing alone be sufficient, or should one resect the swollen segment as well? Should one be satisfied with freeing for the present and reserve the more radical resection for a later operation, if no recovery succeed the freeing? These and questions like these mentally assail the surgeon, and they have to be decided quickly. If the spindle be large and hard it will no doubt be best to excise it at once; if not marked in degree and with the appearance and feel more of normal nerve trunk the surgeon will probably be well advised to defer resection to such later period as may show that regeneration or re-establishment of conduction is not occurring; but there will remain many intermediate cases where the indications are obscure.

Cases which, when the nerve be freed, show other accompanying lesions of the nerve—for example, partial or complete fibrosis—must be treated as described in the sections dealing with such lesions.

5. When the division is physiological and the lesion adherent perineuritis.

In the cases where this lesion has been found in conjunction with a clinically complete division, there has also been anatomical division or complete fibrosis of a segment of the nerve, as well as a considerable length of nerve above and below in an inflammation which has been acute, subsiding, or has gone on to the stage of fibrous tissue formation. In such cases probably all hope of spontaneous regeneration in the portion the seat of this inflammation or fibrosis must be abandoned; on account of the length of nerve, then, that would require resection such cases will be suitable for nerve transplantation or anastomosis. Where, however, such a process of fibrosis or destructive neuritis and perineuritis has descended the nerve so as to involve its important motor branches, direct operative devices all fail, and resort must be had to such indirect ones as are detailed concerning hopeless cases.

6. Where there is combined anatomical and physiological division, the physiological part of the lesion consisting of a spindle.

Resection of the whole thickness of the nerve will most probably be indicated. This condition is most likely to occur in the case of the great sciatic nerve.

7. Where there is combined anatomical and physiological division, the latter part consisting of fibrosis of the nerve.

Resection of the whole is absolutely indicated.

8. Where there is combined anatomical and physiological division, the latter part of the lesion being constriction or strangulation.

Freeing the one part with resection of the ends of the other is indicated. This lesion occurs most commonly in the case of the great sciatic nerve; fortunately the two portions of this nerve are often separate—if not they are always easily separable—up into the pelvis, so that the part anatomically divided can be stretched, resected, and sutured independently of the part with physiological division.

B.—*Where the Division is Clinically Incomplete and Operative Interference is Desirable.*

1. Where the division is physiological and the lesion a spindle.

Resection and suture will be indicated in most cases.

2. Where the division is physiological and the lesion strangulation by scar tissue, etc.

Freeing alone is indicated.

3. Where part only of the cross-section or thickness of the nerve trunk for a greater or less extent is replaced by fibrous tissue.

These cases are of great difficulty, and if they occur unexpectedly—as they are very liable to do—may puzzle the surgeon very much. There would appear to be three different courses: (1) Leave the nerve alone; (2) resect the whole affected segment and resuture; (3) resect merely that portion that is fibrous, and after stretching split the nerve longitudinally, both up and down, and suture the upper cut portion to the lower.

As a general rule, it would seem right to adopt the first course where the loss—motor, sensory, trophic, etc.—is neither very extensive nor very important compared to the further loss that would result from complete resection; the second course, where the further loss risked and added would be slight in degree and relatively unimportant in nature and position compared to that already existing; the third course could then be adopted in cases clinically intermediate as regards these points between these extremes. In many cases, however, it is and will be very difficult to know which of these three procedures to adopt.

4. Where the lesion is merely perineural adhesions.

These should be freed as far as possible and the nerve well stretched.

5. Where there is combined anatomical completeness with physiological incompleteness.

Such conditions must be dealt with on the lines laid down in the preceding sections.

Of course in many cases two or more of the various pathological conditions described above coexist as component parts of the same lesion.

Again, the nerve may be damaged and the seat of one or more of the described pathological states at two or even more distinct points in its course. It is very essential that such should not be overlooked. This is liable to occur in cases where several wounds lie about or cross the path of the nerve, or, in the case of the musculo-spiral and other nerves coming into intimate relations with bones, where the nerve is not only affected directly by the projectile but also damaged or involved indirectly at some other point by a concomitant fracture of the contiguous bone.

### NERVE TRANSPLANTATION AND NERVE ANASTOMOSIS.

One of the greatest problems as it is one of the greatest practical difficulties in present-day operative work on damaged nerves arises when, after stretching to the maximum amount possible or desirable and resection of the requisite amount of the nerve trunk or ends, it is not found possible to get the cut ends to meet, much less to procure accurate and close apposition of the cut surfaces.

Where the distance that remains to be bridged over is short, such possibly successful devices should first be tried as:

1. Adjustment and fixation of the segments of the limb or of the part the seat of operation—for example, by such flexion, such extension, etc., of neighbouring or concerned joints as will relax as far as possible the soft tissues in which the nerve is lying and also the tension of the nerve itself.

Some writers, however, have condemned the practice of this procedure on the ground that the strain put upon the suture line by subsequent working out of the fixed position of the limb is likely to cause the production of excessive fibrous tissue at that point.

2. Sometimes a shorter artificial path can be made through or between or over muscles. This has often the further advantage that the new path thus formed gives a bed for the sutured nerve more free from scar tissue and hence more favourable to regeneration.

3. When these do not suffice to bring the ends together, and but a very short distance still separates them, the strands of fine catgut of the suture may be trusted to act as conductors for the new fibres, especially if a tube of some animal membrane be carefully wrapped around both the nerve ends and the strands uniting them.

If, however, the gap be at all considerable then one has to resort to either of the following methods: (1) Nerve transplantation, (2) nerve anastomosis. The relative merits and demerits of these two procedures have as yet not been determined with any degree of certainty. Often, of course, anatomical and physical conditions decide for the surgeon which of the two to make use of in any particular case. In other cases this will be determined on grounds of theoretical consideration and probability.

*Nerve Transplantation.*

Conditions in which this method would seem to be indicated may be summed up in general terms as follows:

1. Where the distance to be bridged is relatively short.
2. Where no suitable or neighbouring nerve is available.
3. Where the affected nerve is of considerably less importance than the nerve to which it would have to be anastomosed.
4. Where, as in the case of the musculo-spiral, a suitable nerve for an autogenous graft (for example, the radial) is conveniently obtained.
5. Where a suitable homogenous graft is available.
6. Where the bed in which the graft will lie is composed of tissues favourable to the survival of the graft, which will not then run the risk of being strangled by fibrous tissue around it.

The nerves most favourable for use as autogenous grafts are the radial and the external cutaneous of the thigh.

*Nerve Anastomosis.*

On general grounds this procedure would seem to be indicated:

1. Where the distance to be bridged exceeds three inches.
2. Where a neighbouring nerve of considerably less importance and suitable size is available.
3. Where, if a graft were used, it would have to lie in a mass of already present scar tissue.

The varieties of anastomosis methods that are recommended are as follows:

1. *Partial Peripheral Anastomosis.*—The healthy though degenerated distal end of the affected nerve is inserted into a longitudinal slit in the sound nerve, if the nerves be small ones; if the nerves be large, the distal end of the affected nerve is sutured to a flap raised from the sound nerve at a point as far as possible proximal to the point of origin of any important branch.

2. *Implantation of both central and peripheral ends* of the affected nerve into longitudinal slits of the sound nerve may be advisable where the latter is chiefly or wholly sensory.

3. *Complete peripheral anastomosis* between the central end of the sound nerve, which is cut for the purpose, and the distal end of the affected nerve is justifiable only in very exceptional cases. Such a case was one in which the median nerve was destroyed from just above the wrist right up to the elbow. Inasmuch as the ulnar nerve in the hand—at any rate from the motor point of view—is a very much more important nerve than the median, it was not thought advisable to perform an anastomosis with it; but the radial was cut low down in the forearm and sutured to the distal end of the median. Of course, in this case all hope of recovery of power in those muscles of the hand supplied by the median was abandoned.

In the rare event of an ununited fracture of the bone of the limb segment being present with an extensive destruction of a nerve, shortening of the limb by resection of the bone would seem to be quite a justifiable procedure.

2. THE PREVENTION OF FIBROUS INGROWTH.

The necessity for the use of some wrapping material is still *sub judice*; on theoretical grounds at any rate it seems desirable. That Cargile membrane does not by the end of three weeks contract adhesions or absorb is proved by a recent case. At the first operation the writer removed an aneurysm of the third part of the axillary artery, an extensive lesion of the musculo-spiral nerve being found. It was found impossible to unite the ends, and strands of catgut were inserted, and they, with the divided ends, surrounded by membrane. Three weeks later the nerve was again operated upon, grafts of the radial and external cutaneous nerves being inserted; the Cargile membrane was found as it had been inserted.

The substances most frequently used for wrapping are Cargile membrane, hardened arterial tubes, segments of the internal saphenous or other large vein, and pieces of fascia lata and adipose tissue.

Some French surgeons, however, have recently been painting the nerves with sterilized olive oil in order to prevent fibrous ingrowth and the formation of dangerous adhesions.

OPERATIVE TREATMENT IN HOPELESS CASES.

*Amputation.*

The presence and recognition of injury to one or more nerves in a badly smashed limb may be the deciding factor in a decision to amputate.

Apart from such cases, however, one may be forced to amputate on direct account of the nerve injury:

1. Where after operation on the great sciatic nerve the sensory recovery does not get beyond the stage of recovery of protopathic sensibility with intense hyperalgesia.
2. Where recovery after operation on the nerves of the lower extremity does not include return of protopathic sensibility in the sole of the foot, and trophic sores and perforating ulcers cause trouble.

In hopeless cases or where motor recovery has not occurred, such operations as *muscle transplantation, arthrodesis*, and *insertion of artificial silk ligaments*, which have a recognized place in the treatment of infantile paralysis, may be performed with great advantage to the patient.

## A CASE OF ENTEROSPASM IN WHICH THE PORTION OF INTESTINE INVOLVED WAS OF UNUSUAL EXTENT.

BY

C. HAMILTON WHITEFORD, M.R.C.S., L.R.C.P.

H. P. HAWKINS, in his comprehensive article on enterospasm,[1] says:

> Without any change in the intestinal wall, one or more sections of the intestine may exhibit a purposeless tetanic contraction. It is thereby converted into a hard, nearly solid, cord, pale and bloodless.

The second case of Hawkins's series presented symptoms almost identical with those of the case here recorded.

A woman, aged 49 years, wife of a shipwright pensioner and mother of two grown-up children, for thirty years suffered from "indigestion," with vomiting on an average once a week; nine years ago the discomfort increased to actual pain, which occurred soon after ingestion of food, milk causing less pain than solid food. The vomiting gradually became more frequent. During the last five years she had had many family worries.

*Condition when First Seen.*

She was thin, with only a quarter of an inch of abdominal subcutaneous fat, and stated that four years ago she was quite plump. Vomiting was occurring once daily, usually after breakfast. The vomit had never contained blood. Constipation with flatulence had existed for many years.

The only abnormality observed in the abdomen was a tender, ill-defined fullness situated between the umbilicus and the left costal margin. This tender area was constant. Nothing was observed on rectal and vaginal examination except a mobile retroverted uterus with an elongated cervix. A pessary had been worn for twenty years. Treatment by diet and drugs had given very little relief; the patient, neurasthenic, but not in the least hysterical, and of remarkable intelligence, willingly accepted an exploratory coeliotomy, fully appreciating the uncertainty of the benefits which operation might afford.

*Operation.*

Coeliotomy demonstrated that the stomach was enormously distended by gas, measuring in its greatest circumference 14 in., and that the duodenum was uniformly distended by gas (diameter 1¾ in.). The small intestine was traced downwards for its whole length. The upper 3 ft. of jejunum were distended by gas to the size of the duodenum. Three feet from the duodenum the jejunum became abruptly narrowed, being in a state of intense contraction. The next 3 ft. of jejunum were uniformly contracted into a rugose, anaemic cord half an inch in diameter. Below the spastic area the rest of the small intestine was normal, as was the large bowel.

The other viscera showed no abnormality except undue mobility. Absence of fat was marked, the gastro-colic omentum being diaphanous. The head of the pancreas was so loosely attached that it, together with nearly the whole length of the duodenum, was easily lifted above the level of the abdominal skin. The abdomen was closed.

*After-Course.*

At the time of writing, a month after operation, the patient is taking ordinary food and does not vomit; the bowels act daily under paraffin and drachm doses of liquorice powder. Such post-operative improvement, with attention to the bowels and rest in bed, appears to be of common occurrence, but, unfortunately, is apt to be only temporary.

I have seen at operation a number of cases in which the small intestine was either found in, or quickly passed into, a

state of tetanic contraction, but in all these the bowel was involved only for a few inches. Sometimes the contracted area, on being bathed with hot saline solution, was seen to relax and assume a normal appearance. No such observation was permissible in the above case, the manipulations having produced a marked degree of shock.

In regard to the action of belladonna as an antispasmodic, the patient, who was anaesthetized with ethyl chloride followed by open ether, had received one hour prior to operation a hypodermic injection of atropine $\frac{1}{50}$ grain. Enterospasm may simulate almost any intra-abdominal lesion, either chronic or acute, and is one explanation of cases which appear to be some variety of the "acute abdomen" but in which operation shows nothing abnormal, the surgeon not always being so fortunate as to catch the intestine in a state of spasm.

James Swain[2] has recorded a case resembling acute obstruction in which only spastic intestine was found; also a case resembling perforation of a gastric ulcer in which operation showed no cause for the symptoms. This last patient had previously undergone gastro-enterostomy, nephropexy, and removal of the appendix. In cases resembling an infective lesion the absence of an increase in the number of the leucocytes is a useful aid to diagnosis.

Mimicry by enterospasm of chronic abdominal affections is not uncommon. I have another patient, a medical man, aged 49, who has for ten years suffered from attacks of abdominal discomfort, sometimes aggravated into acute pain. He is mildly neurasthenic, and the attacks follow periods of excessive work or undue worry. They have at different times suggested chronic cholecystitis and a colonic growth, but nothing definite has ever been demonstrable, and the patient not unnaturally declines operation. In this case the spasm sometimes involves the rectum and perineum, the patient being awakened in the early hours of the morning by an intense sacro-rectal pain, which is relieved by firm pressure made on the perineum, and terminates with expulsion of flatus.

Among Hawkins's observations are the following:

> There is much abdominal pain which has no name and does not kill.
>
> Such patients may be intelligent and industrious, but they are none the less emotional. They are neurasthenic in the sense that the nervous power is rapidly exhausted by exertion of body or mind, and is but slowly restored.
>
> The abdominal trouble varies directly with the mental state.
>
> In nearly all of these cases some part of the colon can be felt as a hard cord about the size of a man's forefinger. This is more common in the left iliac fossa than elsewhere.

But it is well to remember that in patients with no symptoms of enterospasm it is usually easy, provided they are thin, to palpate the iliac colon as a rounded cord. Enterospasm frequently simulates chronic appendicitis, and Hawkins, after quoting eleven cases in which removal of the appendix caused no improvement, says:

> It would be a gain if only it were generally allowed that not all pain in the right side is due to disease of the appendix, but may have such a comparatively harmless nature as is here suggested.

He concludes:

> There is no disguising the fact that patients exist whose intelligence is of such an order that, if suspicion has once been cast upon the state of their appendix, they will not rest satisfied until it is excised. Finally, in cases in which the pain is probably of the functional kind and yet the possibility of appendix disease cannot be excluded, it is certainly helpful to the physician if the appendix has already been removed. On carrying out his course of treatment, he can then act more freely than if a doubtful appendix were still present.

Tissues which are diseased frequently need removal, but that asthenia, whether it be of the patient's intellect or of the physician's efforts, should be treated by ablation of organs not obviously abnormal, is a proposition which I am unable to accept.

REFERENCES.

[1] BRITISH MEDICAL JOURNAL, January 13th, 1906, p. 65. [2] Ibid., June 22nd, 1912, p. 1412.

THE University of Lausanne recently celebrated the twenty-fifth anniversary of its foundation. Among those upon whom honorary degrees were conferred on the occasion was Dr. Rollier, who has taken a leading part in the introduction of the sun cure for tuberculous diseases of bone in Switzerland.

# PRACTICAL METHODS OF ANAESTHESIA.*

BY

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THE word "practical" in this paper means:

1. That the anaesthetic should be suited to the patient, to be modified or changed entirely if indicated.

2. That the induction should be pleasant to the patient, respiration, blood pressure, and colour reflex remaining normal.

3. That the maintenance of anaesthesia should vary with the requirements of the surgeon, at the same time keeping the patient's condition as nearly normal as possible.

4. That the transition from the anaesthetic stage should be as gradual and smooth as the induction, the patient emerging as from a quiet sleep, without pain, nausea, or conscious or unconscious vomiting.

All of these requirements are met by modern methods, not yet in general use by the excessively utilitarian surgeon who employs one method, administered by a nurse anaesthetist. Anaesthesia is a vital part of the practice of medicine. The adoption of any one method, and hence of any one anaesthetic, regardless of conditions, is contrary to the common sense that should govern all surgical procedures and the administration of all drugs. When a surgeon assumes the responsibility for the narcosis he becomes an anaesthetist. It is almost impossible for him to keep up with the literature of his own speciality; that he is not up to date on the subject of anaesthesia is proved by the type of anaesthesia witnessed in some of the best known clinics of to-day.

It is begging the question to say that the nurse anaesthetist is superior to the average interne. On the other hand, the professional anaesthetist must modify his point of view. A physician specializing in anaesthesia should have control of this department in every large hospital, in every medical college, and in every large teaching clinic. It is inexcusable to place nurses in absolute charge of anaesthesia in large teaching clinics.

The nurse anaesthetist has proved to be entirely "practical," according to some surgeons; but it is proposed to discuss the subject under the higher meaning of the word "practical," as briefly as possible.

### *Preliminary and Post operative Medication.*

In order to forestall acidosis, the patient should be given sodium bicarbonate and lactose, one drachm of each, every four hours for at least forty-eight hours before the operation. If the urine is already acid the dose of sodium should be increased. Glucose, by the rectum, should be given after the operation (Buckler). Bonnot and Cleveland, of St. Louis, after using quinine salts in 600 cases, recommended quinine muriate, grains 10, dissolved in 2 ounces of water at 100° F., to be given immediately after operation, and to be followed in thirty minutes by saline proctoclysis, or in septic cases by six ounces of olive oil. The quinine is repeated every six hours for from four to six doses. It is stated that with this medication "backache is practically eliminated, and only about 2 per cent. suffer gas pains."

*Preliminary narcotic medication* is indicated in nearly every case. It should vary with the patient and with the individual anaesthetist. Without such preparation, a rise of blood pressure at the very thought of the operation, together with other changes from the normal, may prevent the smooth induction, the easy maintenance, and the uneventful recovery that would otherwise be obtained.

Instead of morphine, which sometimes in itself produces nausea, we prefer the following preliminary, which is modified to suit the individual case:

℞

| | | |
|---|---|---|
| Paraldehyde } | | |
| Pot. bromid. } | ... ... ... ... ... | āā ʒi–ij |
| Aquae ... ... ... ... ... ... | | q.s. ad ʒiv |

M. Sig.: With the patient in Sims's position give, per rectum, 40 to 90 minutes before operation.

It has been proved, in the laboratory, that with this medication: (1) Anaesthesia comes on more promptly and

* Read before the New York and New England Association of Railway Surgeons, New York, October, 1916.

less ether is required; (2) the margin of safety is increased, thus making anaesthesia a safer procedure.

This medication may possibly have the same effect as Crile seems to have found with morphine—that is, a regulator of acidosis. In fact, Crile recommends bromides by the rectum for this purpose. Codeine also may be used instead of morphine.

*Anaesthetic Agents.*

While morphine has long since been discarded as a general anaesthetic, it is well to bear in mind, in railway emergency work, that a patient is safer with morphine and alcohol than with either drug alone. Also, that with this combination an analgesic stage comes on before unconsciousness, just as, in the amputation of a limb, a tourniquet completes the analgesia long before the alcohol sleep commences.

Chloroform, anesthol, and ethyl chloride are rarely used in this climate as the terminal anaesthetic; as the initiatory agent, however, or to supplement other anaesthetics, they are most useful.

The essence of orange (composed of 25 per cent. oil of bitter orange peel and 75 per cent. absolute alcohol) is not in itself an anaesthetic, but the fact that its odour is ten times as penetrating as that of ether vapour makes it a safer and better introductory agent to ether by the closed method than nitrous oxide. The physiological basis for the beneficial effect of the oil of orange in the administration of inhalation anaesthetics may be found in its prevention of reflex stimulation, by the anaesthetic, of certain sensory nerves.

Dastré[1] attributed early syncope to reflex stimulation of the pneumogastric and trigeminal nerves, particularly the sensory branches supplying the nasal mucous membrane and the larynx. Embley[2] also has emphasized the part played by the increased excitability of the vagus mechanism, particularly during the early part of the administration. In his inhalation experiments he found that failure of respiration is mainly due to fall in blood pressure. With good blood pressure failure of respiration (his experiments concerned chloroform) is practically impossible. Restoration of respiration is dependent upon restoration of blood pressure. The chances of dangerous vagus inhibition are greatly increased by imperfect respiration.

From these findings it would seem fair to assume that any factor which prevents undue inhibition of the nervous mechanism of respiration, and which, by its stimulation of the respiratory centre, prevents fall in blood pressure, will have a beneficial influence upon the course of the anaesthesia. The oil of orange seems to exert this beneficial influence by dulling the sense of smell to such an extent that the odour of the anaesthetic is not noticeable during the administration.

Essence of orange is also useful when ethyl chloride, chloroform, or anesthol are used as the introductory to ether by the open method.

When chloroform is given with the proper apparatus, providing for oxygen, air, and rebreathing throughout, the patient goes under and comes out of the anaesthetic as quickly as with nitrous oxide and oxygen, and with immunity unimpaired.

In emergency practice, when chloroform is used it is safer and better in every way to surround the mask with paper or a towel, and to have rebreathing throughout, thus diminishing the amount of the anaesthetic used by one-half or less. Safety is also increased by dipping the chloroform bottle in a vessel of hot water from time to time, in order to keep the agent warm. This is in line with the theory that warm anaesthetics are safer than cold.

"Open drop ether" is a crude, unscientific method of administering this drug. It is responsible for the ill repute borne by ether to-day, especially as regards nausea and vomiting. Administered in this way by the best "artist" in the world, it is irregular and uneven and conduces to a tendency to acidosis and resultant shock on account of the insufficient supply of oxygen.

The "gas-ether sequence"—administration of nitrous oxide followed by ether—is an even cruder and more dangerous method than the "open drop." It raises the blood pressure enormously, cyanoses the patient, and is responsible for many deaths.

Any apparatus dependent upon automatic suction is theoretically contraindicated on account of the unusual strain placed upon the respiratory centre.

The nitrous oxide–oxygen–ether sequence by the closed method removes all the objectionable features of the gas–ether sequence, and should be used whenever a closed method is indicated.

The endotracheal method, introduced by Meltzer, has been called the "luxury of breathing." The patient can be given this same luxury by the endopharyngeal method, which is now used by those who formerly employed the Meltzer technique. The same results are secured, however, with the vapour mask which some of us have been using for more than ten years.

The "vapour mask" is any chloroform mask covered with gauze and provided with some suitable arrangement for admitting the warmed oxygen–ether vapour. The ether may be vaporized by any air-compressing device, or oxygen may be used from any ordinary low-pressure oxygen tank, or the oxygen tank may be filled with air. This method ensures an even ether vapour tension.

If this vapour is passed to the mask just described, it is called an "open," or, more correctly, a "semi-open" method, inasmuch as the mask is usually covered with towels. If the vapour goes to a rubber bag it is called a "closed" method.

The essence of orange–ether sequence closed method is one in which a mask and a rubber bag are used. The bag is first filled with essence of orange odour, which is followed by ether vapour. The patient goes under the anaesthetic without change of colour, and with respiration and pulse normal. An even, deep, safe anaesthesia is maintained, and the patient comes out with as little discomfort as follows a good nitrous oxide–oxygen administration. The usual amount of ether used is 2½ ounces per hour, as against 4 to 8 ounces by the drop method.

The vapour mask, or semi-open method, should be used in operations on the head, neck, and upper thorax; the closed method in abdominal and other operations requiring relaxation.

The so-called gas–oxygen anaesthesia, supplemented with ether, should be used in selected cases only, and never as a routine. No method known to-day, either local or general, should be used as a routine.

Oil–ether colonic anaesthesia is now a recognized method of administering ether. The patient falls asleep in his bed, quietly, with pulse and respiration about normal, and colour reflex fully maintained at all times. This method is indicated wherever the element of fear is prominent, as in goitre cases, suspension laryngoscopies, and similar work. It is especially indicated in the obese alcoholic, a class of patients unsuited to any inhalation method. After a personal experience with colonic anaesthesia I prefer it to any other method.

While the latest available statistics give first place, as regards life, to nitrous oxide and oxygen, yet so many deaths have been reported from to time, since the more general use of this combination, that we are forced to conclude that it is not as safe as is generally supposed, at least with our present methods of administration.

I have devised, therefore, and am now using, a semi-open method of administering nitrous oxide–oxygen and warmed ether vapour. This ether–nitrous oxide anaesthetic vapour is now warmed, moistened, oxygenated, and deodorized. When administered in this way the patient neither tastes nor smells the ether at any time. The mask described is used, allowing the patient at all times to get such an abundance of anaesthetic vapours that there is no strain whatever upon the respiratory centre.

Unquestionably, the preliminary and after treatment of the patient are as important as the anaesthetic or the method of administration. The anaesthetist, therefore, should have entire charge of this treatment, as well as the selection of the anaesthetic, if he is to be held responsible for the condition of the patient after the operation. These conditions being granted, it can readily be appreciated that we make no rash promises to any patient in assuring him of a pleasant and safe voyage through the narcotic zone.

REFERENCES.

[1] Dastré, *Les anesthétiques*, Paris, 1901, pp. 104–9. [2] Embley, BRITISH MEDICAL JOURNAL, April 5th, 12th, and 19th, 1902.

# Memoranda:

## MEDICAL, SURGICAL, OBSTETRICAL.

### A CASE OF RECURRENT TETANUS.

THE following case seems of sufficient interest to place on record. It shows that a man, in spite of a previous attack of tetanus, and in spite of receiving large quantities of antitoxin, may again be attacked and succumb. He was wounded by shrapnel over the right scapula, and received a prophylactic injection of antitetanic serum on the same day. The onset of the first attack of tetanus occurred on the sixteenth day; between this and the twenty-sixth day he received 27,000 units of antitetanic serum. On the fifty-fifth and again on the sixty-fourth days he received a prophylactic dose of 500 units. The onset of the second attack of tetanus occurred on the sixty-seventh day, and between that and the seventy-fourth day he received 21,000 units intrathecally. He died of tetanus on the seventy-fourth day.

This patient died during a second attack of tetanus after an interval of forty-two days of apparently complete recovery after the first attack. The original attack was one of the worst I have seen in this country, although it was mild compared with the severity of the tetanic spasms I saw in a considerable number of Chinese wounded whom I had under care during the Russo-Japanese war, proving, I think, that the prophylactic injection, if it does not in all cases prevent an attack, at least greatly modifies the severity of the symptoms.

A. M. WESTWATER, F.R.C.S.Edin.

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### GASTRECTOMY FOR CARCINOMA OF THE STOMACH: SEQUEL.

IN May, 1909, I operated upon a lady, a patient of Mr. Gordon Brown and Dr. A. P. Gibbons of Finsbury Circus, for carcinoma of the stomach, originating on the edge of a chronic ulcer. The duodenum was divided and the distal end closed. Nearly the whole of the stomach was removed, only a small portion of the cardiac end—to which the side of the duodenum was attached—being left. The patient recovered completely from the operation and led a very active life. At the end of five years the case was reported in the BRITISH MEDICAL JOURNAL as a success. The specimen itself is in the museum of the Royal College of Surgeons.

In November, 1916, I was called in to see her by Dr. Clarke Wakefield of Brondesbury, under whose care she was at that time, as she was suffering from jaundice. The liver was not enlarged and the gall bladder could not be felt, but an exploratory operation was performed under the impression that there might be a recurrence in the stump of the duodenum involving the orifice of the bile duct, and that cholecystostomy might give relief. The gall bladder, however, was empty and the duodenum free, but the whole liver was full of small nodules of an unmistakable character. The jaundice deepened, the growth appeared to involve the suprarenal bodies, and the patient died from asthenia in February, 1917, seven and a half years after the original operation, for seven of which she had enjoyed perfect health.

In all probability the final growth in this case should be considered as secondary to the original one, starting in cancer cells that had become detached and embedded in the liver before the operation, and the operation itself must be classed among those performed too late, like nearly all operations for carcinoma of the stomach. The time it is true is long, though I have known longer. I have, for example, known carcinomatous cells begin to grow in supraclavicular glands thirteen years after removal of a breast for scirrhus without any recurrence locally, and it is difficult to account for such a sudden and widely spread awakening after so many years.

It must always be remembered, too, that one attack of carcinoma does not confer immunity from a second. On the contrary, there is reason to think that there may be such a thing as an actual predisposition on the part either of the individual or of the organ concerned encouraging a second outbreak. I have under my care at the present time a lady whose left breast I removed for carcinoma eleven years ago. The old scar—it was a complete operation, with removal of both pectoral muscles—is perfectly sound; there are no glands to be felt anywhere, and her general health is perfect, but there is a typical scirrhus growth in the opposite breast in exactly the same locality. There can be no question of secondary infection in such a case as this, and I could quote others similar to it though not of such long duration. For the present the question must be left open.

C. MANSELL MOULLIN, F.R.C.S.,
Lieut.-Col. R.A.M.C.(T.).

London, W.

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# Reports of Societies.

### ORIGIN OF THE ELECTRIC CURRENTS LED OFF FROM THE HUMAN BODY.

AT the meeting of the Section of Electro-Therapeutics of the Royal Society of Medicine on March 16th, when Dr. HARRISON ORTON, President, was in the chair, Professor W. M. BAYLISS read the paper on the origin of electric currents led off from the human body, especially in relation to "nerve-leaks," which is published at page 387.

In the course of the subsequent discussion Captain MACDONALD said that if wounds in a denervated limb healed as rapidly as those in a normal limb, why was it that such bad sores were seen on paralysed patients, and why was it inadvisable to perform operations on paralysed parts? He had seen dielectric oil used for trench feet in France with great success.

Dr. AGNES SAVILL said that she had used dielectric oil for eczema. The patient had eczema on both feet; one foot was treated by dielectric oil and the other by ordinary methods. That treated by the oil healed more quickly, and the treatment was much more pleasant to the patient. Many practitioners were pleased with the results of the oil on inflamed throats.

Mr. HERNAMAN-JOHNSON spoke of the theory as used for diagnosis. He had brought two cases to an exponent of the method. Neither patient was very ill, and there was nothing so evident as to suggest a diagnosis at sight. The procedure was the same in each case. One electrode was placed over the back of the neck and was gradually moved down the spine, being lifted up between each application. In the case of the first patient nothing abnormal occurred until the mid-dorsal region was reached, when the galvanometer needle was noticed to swing more violently. Much the same occurred with the second patient, the abnormal movement occurring at the lumbar region. The first patient was suffering from chronic dysentery, the second from dysmenorrhoea, and later from amenorrhoea. A diagnosis was correctly made of bowel trouble in the one and pelvic trouble in the other, without the patients making any remark at all suggestive of their ailments. Both were rubbed with hot, dry towels; there was no visible moisture. In ulnar paralysis no deflection occurred over the region of distribution of the ulnar nerve. He said that if it could be shown that in lesions of certain organs there was greater deflection over the areas of the nerves supplying that organ, the method might be very useful in diagnosis.

Professor BAYLISS, in reply, said that the difficulty met with in the healing of ulcers and wounds on paralysed limbs was due rather to the difficulty in keeping desensitized limbs free from injury than to the destruction of "trophic nerves"; the limbs were more vulnerable because, being insensitive, they were unable to protect themselves from injury. It was said that the eye degenerated after destruction of the fifth nerve, but if the eye were protected no degeneration occurred. The method might be very useful in diagnosis if "nerve-leaks" occurred with definite lesions, but this was not proved. If a neurasthenic were examined each day would the "nerve-leak" be in the same place? He thought the effect might be brought about by a variation in the amount of sweat on the different parts of the skin. This suggested the question whether there were localized areas of sweating associated with definite lesions—for example, dysentery—but so far there was no proof that this was so. He thought that rubbing with hot towels was not an effective safeguard, as only the surface sweat would be rubbed off.

# Reviews.

## THE CHARAKA CLUB.

THE Charaka Club was founded in 1898 by some New York physicians interested in the literary, artistic, and historical aspects of medicine. They placed themselves, to use an ecclesiastical phrase, under the invocation of Charaka on the assumption that his work is the oldest extant treatise on Hindu medicine. The treatises of Charaka and Susruta are still regarded by many as of great antiquity. On this point, however, we venture to call attention to a communication made to the Paris Académie de Médecine on May 11th, 1897, by Dr. Liétard of Plombières, and published in its *Bulletin*.[1] It is there stated that M. Sylvain Lévi, Professor of Sanscrit at the Sorbonne, had recently discovered a number of documents of great importance in regard to medical chronology. These documents, first written in Sanscrit, but now lost in their original form, have been by a happy accident preserved in a Chinese translation. From them it appears that Charaka was private physician to Kanishka, an Indo-Scythian king who lived in the first century. "The mention of Charaka," says Sylvain Lévi, "is the first positive indication obtained of the date of the learned practitioner who disputes with Susruta the glory of having laid the foundations of medical science in India." Lévi thinks Charaka may have been a contemporary of Christ and that he lived in a medium in which Greek science and the Greek spirit were predominant. At any rate there seems to be good reason to believe that he flourished in the first centuries of the Christian era. His *Samhitâ* contains a chapter of medical deontology closely corresponding with the Oath of Hippocrates.

The first volume of the *Proceedings* of the Charaka Club was published in 1902, and was reviewed in the BRITISH MEDICAL JOURNAL of March 21st, 1903. A short note on the second volume, issued in 1907, appeared in the JOURNAL in the same year (vol. i, 1907, p. 1201). The third volume was not received. The fourth volume now before us is not less interesting than its predecessors.[2] Dr. Arpad G. Gerster gives an account of Professor Harnack's monograph on medicine in early church history, written in honour of the seventieth birthday of his father-in-law, the famous surgeon, Carl Thiersch, and published at Leipzig in 1892; it deals largely with demoniacal possession and exorcism. Dr. George L. Walton writes on the medical saints Cosmas and Damian, who are familiar figures in Roman art, and on the Icons of the Greek Church. The paper is illustrated with some admirable photographic reproductions of pictures in churches in Florence and Rome, and in France, Switzerland, and other countries. The saints are generally shown with their symbolic attributes—pill box, scalpel and forceps, mortar and pestle, caskets, vases, ointment pot, phials, rolled bandage, spatula, and urine glass. They were the patrons of surgeons, apothecaries and barbers, and also of the Medici family, the six red balls on whose coat of arms are held by some to represent pills. From Cosmas the Paris Confraternity of Saint Côme or College of Surgeons derived its name.

In another paper Dr. Walton compares the botanical terms used by Bacon and Shakespeare respectively; he thinks the parallelisms sufficient to "jostle Shakespeare of Stratford a little on his throne." Dr. Joseph Collins, writing on the literary leanings of eighteenth century physicians, says there are few documents of human interest like Boswell's *Life of Johnson*, Saint Simon's *Memoirs*, and Pepys's *Diary*, concerning doctors. An obvious reason for this seems to us to be that much of a doctor's relation to his fellow men is too confidential in its nature to be made the subject of published gossip. Dr. Collins, however, thinks the likely explanation is that medicine does not attract men possessing the artistic temperament, while doctors are so absorbed by their profession that they have no time for the cultivation of literature or art. Here we venture to enter a demurrer. The drawings of Charles Bell are admirable, and Sydney Smith declared that his wax models of disease were the Apollo Belvedere of morbid anatomy. Seymour Haden was the foremost etcher of his day in this country, and founded the Royal Society of Painter-Etchers and Engravers, of which he was president. Prescott Hewett and Henry Thompson were habitual exhibitors at the Royal Academy. Abroad, Richard Liebreich, Paul Richer, and many others have shown that medicine and art are not incompatible. Dr. Collins gives an interesting account of Astruc, physician to Louis XV, and author of a history of syphilis which is a classic. Probably few know that he was a pioneer of the "higher criticism"; it appears to have been his interest in skin diseases that led him to the study of the Bible. Dr. Collins contributes another paper, on medicine in England in Chaucer's time, and Dr. James G. Mumford, who died a few days before the date fixed for the presentation of his paper, writes on the University of Alexandria, which was established by Ptolemy Soter in the fourth century B.C., and in ten years became the greatest in the world. Now the very site of the buildings lies buried in the ooze twenty feet below the modern city. Owing largely to the influence of Herophilus, one of its earliest teachers, Alexandria was long the principal centre of medical research. Dr. Charles L. Dana traces the development of anatomical illustrations in the fifteenth and sixteenth centuries, and gives reproductions from the works of Albertus Magnus, Vesalius, Eustachius, and others.

To readers who find pleasure in wandering in the by-paths of medicine the *Proceedings* of the Charaka Club are full of interest. The illustrations are admirably executed, but the volume is disfigured by irritating misprints. To name only a few taken at random, we have Benvenuto Celleni twice on one page (19); "*boite à remedies*" (p. 21); "*Pepy's Diary*" (p. 27); "Heller" for Haller (p. 28); "Bischat" for Bichat (p. 29); "Bengarius Carpus" for "Berengarius" (p. 70); "Mandeville" for Mondeville (p. 66); "Ambrose Parè (p. 73); existance (p. 108); and Hallowell-Phillips (p. 123 and again p. 124).

[1] *Bull. de l'Acad. de Méd.*, No. 19. Séance du 11 Mai, 1897; 3e série, t. xxxvii. 61e Année.

[2] *The Proceedings of the Charaka Club.* Vol. iv. New York: William Wood and Company. 1916. (Roy. 8vo, pp. 163; illustrated.)

## NOTES ON BOOKS.

*St. Thomas's Hospital Reports*[3] for the year 1914 contain twelve reports from various departments of the hospital, for the most part statistical in character, and a full statistical review of acute intestinal obstruction by Mr. S. H. Rouquette, surgical registrar. This has been compiled to determine the immediate results of operation in 615 of these cases treated during the years 1908–1913; 315 were instances of strangulated external hernia, 93 were cases of non-malignant obstruction excluding intussusception, 82 were examples of malignant obstruction, and 125 were cases of intussusception—all but 3 occurring in patients under 11 years of age. The mortalities in these four groups were 21, 45, 56, and 30 per cent. respectively. A statistical analysis of the results of operation is given, extending to six pages.

The fifty-sixth issue of *The British Journal Photographic Almanac and Photographer's Daily Companion*,[4] for the year 1917, is the first issued since 1914. The volume is reduced in bulk, the edition is reduced in size, and the quality of the paper has been lowered. But photographers all the world over will accept these war economies without complaint, for the *Almanac* preserves its sterling qualities in spite of the war. The present issue has some 400 pages of advertisements; it also contains a directory of photographic societies and photographic bodies, an epitome of progress written by the editor, 100 pages of formulae and miscellaneous information, and 40 pages of serviceable tables. The only error of any importance we have found in it is on page 501, where the price of Mr. G. L. Johnson's book on *Photography in Colours*, now in its third edition, is given as 3s. 6d. instead of 4s. 6d.

[3] *St. Thomas's Hospital Reports.* Edited by Dr J. J. Perkins and Mr. C. A. Ballance. New series Vol xliii. London: J. and A. Churchill. 1916. (Demy 8vo, pp 355. 8s. 6d net.)

[4] *The British Journal Photographic Almanac and Photographer's Daily Companion.* 1917. Edited by G. E. Brown, F.I.C. Fifty-sixth issue. London: H. Greenwood and Co., Ltd. 1917. (Crown 8vo, pp. 778; illustrated. 1s. net; cloth, 2s. net.)

AN expansion of the sanatorium at Pedrosa was recently formally opened. The King of Spain was present at the ceremony. Dr. Salazar delivered an address, in which he said that during the past twenty years the average annual mortality from tuberculosis in Spain had been over 50,000.

British Medical Journal.

SATURDAY, MARCH 24TH, 1917.

## THE NATURE AND PREVENTION OF SHOCK.

OF the evil influences which a military surgeon has to combat when a severely wounded man is first brought to him for treatment, shock, haemorrhage, and commencing sepsis are the chief; of these he most dreads shock, for he is less well equipped to deal with it, and until it has been overcome it may not be possible for him to undertake the operation which he knows to be necessary to diminish the risk of sepsis. Shock is also the danger ever present in the mind of the surgeon in civil practice, whether due to the accident which brings the patient into his hands or to the nature of the operation he may perform. Any light on its causation and treatment will be welcomed therefore by all surgeons, and the memorandum issued by the Medical Research Committee and printed in this issue of the JOURNAL will make a very strong appeal to them.

Owing to the immense importance of the subject to military surgery the Committee has thought it well to publish at once certain results of an experimental inquiry conducted for it by two investigators, H. H. Dale and P. P. Laidlaw, who have made a close analysis of the shock-like phenomena produced by the injection of a particular base, histamine, the peculiar properties of which they had noted some years ago. Its injection produces a profound fall of blood pressure, accompanied by a striking concentration of the blood, which may be so great that there is a loss of one-half of the original volume of plasma in about five minutes. This concentration is apparently due not merely to loss of water and diffusible constituents, but to the passage into the tissues and lymph spaces of all the constituents of the plasma. A large part of the blood, in fact, disappears from effective circulation, the veins are not distended, the great veins fill only very slowly from the periphery if clamped, and though the heart continues to beat with moderate vigour the arteries are pulseless. The capillaries in health have the power of active contraction, and it appears that under the action of this poison the capillary tone is lost, so that the blood from the arteries being stagnant in the slack capillary channels the quantity reaching the veins is inadequate for the filling of the heart; the cardiac output, therefore, falls to a very low level. Further, the slowness of the capillary circulation through the muscles and other tissues needing a plentiful supply of oxygen must lead to defective oxidation, with resulting acidity, and so to a further tendency for passage of water by osmosis from the blood.

Effects of the same general type can be produced by many products of protein digestion and bacterial activity; among these the condition commonly spoken of as the toxaemia of gas gangrene is to-day of special importance; the evidence so far obtained suggests that there is a fundamental similarity of origin underlying the similarity of symptoms between the toxaemia of gas gangrene and other shock-like conditions.

The point of most novel interest in the memorandum is the importance attributed to loss of plasma into the tissue spaces as a factor in the production of the circulatory failure. The loss causes both deficient volume and excessive viscosity of the blood, and this condition has been clinically recognized as an essential factor in the collapse occurring in cholera and in bacillary dysentery, where the fluid is lost by excretion. The Committee asks for reports of clinical studies or experimental observations bearing upon the questions raised in its memorandum, and intends later on to publish further results of the inquiries now in progress, along with such relevant clinical observations as may then be available. It is suggested that cases of traumatic shock without haemorrhage, of post-operative shock, of intestinal obstruction, of extensive burns, of anaphylactic shock, and of the rapid fulminating type of toxaemia from gas gangrene, may give relatively uncomplicated data for estimating the changes of the corpuscular element of the blood.

As to treatment, the importance of prevention is insisted upon, and it is pointed out that an antecedent haemorrhage, insufficient in itself to produce collapse, may be an important factor in the subsequent onset of shock, in so far as it is due to deficient volume apart from increased viscosity of the blood. The normal reaction to simple haemorrhage sufficiently large to diminish the output of the heart and lower the blood pressure, consists in the abstraction of fluid from the tissues until the volume of the blood is again adequate. The experiments now reported suggest that this restorative reaction fails in shock, and that the fluid continues to pass from the blood, even though the arterial pressure has fallen to a very low level. A relatively small haemorrhage, therefore, may have a serious influence in determining the onset of shock. Other causes tending to diminish the blood volume—such as fatigue, exposure, or prolonged abstinence from food and water—are well recognized by military surgeons as tending to shock; but it may be that sometimes measures preparatory to operation in hospital, such as free saline purgation and strict abstinence from food and water, may contribute to the danger. At any rate, we believe it to be true that the experience of the casualty clearing stations in this war is that exactly the opposite line of treatment must be followed in attempting to restore a patient sufficiently to withstand an operation; and so far, therefore, clinical practice has anticipated the experimental conclusion that a free supply of fluid, by infusion of physiological saline into the rectum or the subcutaneous tissues, must be begun before operation. The only drug which can be used with any advantage when shock has once developed is pituitary extract, which causes a prolonged and general contraction of the arterioles, thereby diminishing the total capacity of the circulatory system and mitigating the effect of a deficient blood volume. For reasons given in the memorandum the use of adrenalin, apart from the fact that its effect is fugitive, is open to objection. In place of the injection of physiological saline in fully developed shock the use of intravenous injections of hypertonic saline is suggested in the manner found valuable in the treatment of collapse of cholera and dysentery; the addition of calcium chloride to the solution is proposed, inasmuch as it has been found that calcium ions have a specific action in reducing abnormal permeability of capillaries. The aim in the treatment of shock should be to restore the volume of blood in effective circulation and at the same time to reduce the abnormal viscosity. An incidental effect of failure of the circulation is the defective oxidation of even the arterial blood, a fact which suggests that inhalations of oxygen may have some value.

## SCIENCE AND THE NATION.

IN Homer's day it was generally recognized that the destinies of empires were among the things that lay upon the knees of the gods. In our own country, however, and under our own parliamentary system, it is held that this particular burden has now been transferred to the knees of the man in the street. It is therefore of the utmost importance that the man in the street should be rightly informed, and hold sound views about the things that really matter, so far as the future of our empire is concerned. One of the chief of these things is the attitude he adopts towards research and the progress of pure science. A most timely volume of essays on various aspects of this subject, written by a number of distinguished Cambridge graduates, edited by the Master of Downing College, and furnished with an introduction by Lord Moulton, has recently been published by the Cambridge University Press.[1] The object of this most readable book is to show that progress in applied science is directly dependent upon progress in pure science, and that progress in pure science is dependent upon the direct encouragement it receives from those who profit by its advances.

The course of the present war has brought out, more clearly, perhaps, than ever before, the vast influences of applied science upon the material progress of nations, whether in war time or in peace. As we read every day in the papers, modern warfare has been reduced to the science of destructive engineering in the line of battle, supported behind the lines with all that constructive engineering can organize in the way of railways, road transport, hospital and housing facilities, commissariat, and the thousand and one other material evidences of scientific discovery and invention. The importance of applied science to the arts of peace is a point that need not be laboured here, for it is a truism. Applied science may be defined in Huxley's words as "nothing but the application of pure science to particular classes of problems." Pure science—or, as Lord Moulton prefers to call it, experimental research inspired purely by the desire to increase knowledge—is science pursued for its own sake quite apart from utilitarian purposes. What is wanted at the present moment is that the man in the street should recognize that pure science must be fed, and fed more liberally than it has been in the past, if applied science is not to be starved in the future. Just before the war there was established in connexion with the National Insurance Acts a considerable endowment for research in medicine, an entirely new departure in the policy of this country. Once the public becomes convinced of the fact, long known to experts, that there is money in it, pure science or experimental research is sure to receive the reward and recognition that are its due. Indeed, a further step in this direction has just been taken by the Government. In the Civil Service Estimates relating to education, science, and art for the coming year, provision is made for a grant in aid of scientific and industrial research amounting to £1,000,000. Grants from this fund will be made by direction of the Privy Council Committee to approved trade associations. It is also provided that the same committee may grant the sum of £24,000 in aid of investigations carried out by learned and scientific societies, and the sum of £6,000 to students and others engaged in research.

[1] *Science and the Nation.* Essays by Cambridge Graduates; with an Introduction by the Right Hon. Lord Moulton, K.C.B., F.R.S.; edited by A. C. Seward, F.R.S. Cambridge: The University Press. 1917. (Demy 8vo, pp. 350. 5s. net.)

The essayists deal with many of the practical applications of pure science. One point of supreme importance that recurs again and again is this: that it is impossible to say beforehand either what line of research is likely to prove rich in practical applications or what practical use will presently be made of the scientific results obtained in the course of any investigation. Thus Professor Pope is able to show that it was the scientific study of the mineral deposits at Stassfurt that enabled Germany before the war to make herself the chief source of supply of potassium salts, indispensable to the whole world as a cultural manure. In his essay on physical research Professor Bragg is able to show how Roentgen's discovery of the *x* rays was directly based on Sir William Crookes's researches into high vacuums, Lenard's discovery of radiations able to pass through aluminium windows fused into vacuum tubes, and an entirely accidental observation of his own. In his essay on the modern science of metals, Dr. Rosenhain is able to show that the vast progress in our knowledge of the physical properties of metals and alloys made in the last few decades, upon which, indeed, almost all our recent engineering achievements depend, dates from the year 1861, when H. C. Sorby, a mineralogist, introduced the method of studying the minute structure of metals by the microscopic examination of metallic surfaces first polished and then etched with acids. At the moment Sorby was seeking for nothing more than further information as to the structure of meteorites; yet at the present time every metallurgical works of any importance has its own metallographic laboratory where the methods of Sorby are daily practised for the control of industrial operations. In his essay on medicine and experimental science Professor Hopkins is able to point out how the whole science of bacteriology may be dated back to the work of Pasteur as a crystallographer, in the days when he chanced to find that of the two distinct but closely related crystalline forms of the salts of tartaric acid, one was fermented and destroyed by a certain mould while the other was not. This accidental observation fixed the attention of the great chemist and crystallographer on fermentation and so led him to the foundation of what is now the science of bacteriology. Again, in his essay on systematized plant breeding Professor Biffen is able to prove that the solution of the problem of intensive cultivation of the land, stated by Swift in the famous aphorism of the two blades of grass has been enormously expedited by the use of the laws of inheritance discovered by Mendel, abbot of Brünn, through his experiments in growing and crossing varieties of the common or garden pea.

In all these instances and in many others that might be quoted, it is important to observe that no one had any inkling of their final results, still less of their possible commercial applications in the future. Never, as Professor Bragg says, was any experiment performed for the sake of making a particular application, but each advance was directed along the line disclosed from the vantage point attained by the efforts just made. There is a sequence of events that cannot be reversed. In that sequence discovery follows on discovery; and science must be pure in the sense that each step is necessarily free from any knowledge of what advantage may be made from it. The step is made not because it will be profitable, but because it is the next step on the only way. Science cannot be applied until there is science to apply, and science must begin as pure science. This is a truth that cannot be too widely realized by those, whether

educational authorities or captains of industry, who have the power to encourage the development of science.

## PREVENTION OF T.N.T. POISONING.

THE Minister of Munitions has issued new rules, under the Defence of the Realm Regulations, governing the use of trinitrotoluene; they make compulsory in all factories and workshops in which trinitrotoluene, or any mixture containing it, is used or manipulated, recommendations made at various times by the Health of Munition Workers Committee. The rules are in two parts, the first applicable to employers, and the second to the employed. The first part directs that the ventilation of every place in which any T.N.T. process is carried on shall be approved and shall, if required, include an approved method for removing dust or fumes at the point of origin. Special arrangements are to be made for reducing to a minimum the contamination of the outside of articles during the process of filling, and all floors, work-benches, trolleys, fittings, or appliances on which T.N.T. may accumulate must be cleaned by an approved method; no oil or grease or other carbon compounds which are solvents of T.N.T. shall be used in any place in which any T.N.T. process is carried on, unless such use has been approved. No person under 16 years of age shall be employed, and the employment of a person under 18 years of age requires special approval. No person is to be employed continuously for more than a fortnight at a process involving contact with T.N.T.; either the person must be given other work or an equal period of absence from work, unless continuous employment has been approved by the medical officer. At every factory or workshop where 2,000 persons are employed there must be at least one whole-time medical officer, and at least one additional medical officer if the number exceeds 2,000, and at all factories and workshops a woman welfare supervisor must be appointed.

Every person employed in a trinitrotoluene process must be examined by the medical officer at least once a week, a health record of all persons employed in any trinitrotoluene process must be kept, a person suspended from work by the medical officer must not be employed in any trinitrotoluene process without written sanction from the medical officer, and the employer must appoint a person responsible for seeing that the order of suspension is obeyed. The employer must provide working costumes, which must be washed, cleansed, or renewed at least once a week, and also proper places for the storage of these costumes, as well as proper places for keeping clothing put off during working hours. The danger of absorption of T.N.T. by the skin is recognized by a rule requiring that approved substance shall be provided for the purpose of cleansing the skin, and also a lavatory with a sufficient supply of water, soap and nail-brushes, and dry towels renewed and washed daily. At every factory or workshop there must be a canteen approved by the Welfare Section of the Ministry, and every person employed must be supplied gratis daily with half a pint of milk or an approved substitute. The second part makes it compulsory on the employed to wear the working costumes provided, and before partaking of food or leaving the premises to remove the working costume, to cleanse the skin with the special fluid provided, and to wash in the lavatory. Employed persons must also submit themselves for examination by the medical officer when required.

The manner in which the Ministry of Munitions has handled the difficult administrative questions arising in connexion with the safeguarding of the health of munition workers has been admirable. It was at once realized that difficulties would arise, owing partly to the employment of a large number of workers, many of them totally inexperienced in any industrial labour, partly to the nature of the processes involved, and partly to the necessity for new agglomerations of population in districts not previously provided with adequate housing accommodation. The housing question was, in fact, one of the first to which the Ministry gave attention, and on that head it had a good deal of experience accumulated by public authorities to draw upon. On many of the questions special to munition factories, particularly those concerning individual hygiene, there was relatively little experience, and at a very early date a committee was appointed, with Sir George Newman as chairman, consisting of scientific medical men drawn from the Medical Research Committee, and the factory department of the Home Office, as well as representatives of employers, of labour, and of women workers. This Committee went systematically to work, and when necessary instituted special scientific inquiries for the carrying out of which the services of physiologists were secured. It has published a long series of memorandums dealing with questions of industrial fatigue, hours of labour, and other matters affecting the personal health and physical efficiency of workers, which are not only of great value in their application to the special conditions of the time, but of permanent importance as contributions to the study of the applied science of industrial hygiene. The Ministry in advising employers, and now in making regulations, has thus been able to work on an assured basis of ascertained facts.

The new regulations are an extension of others issued last September, but owing to the manner in which the Ministry has allowed itself, under the direction of Dr. Christopher Addison, to be guided by expert opinion, it has not been under the necessity of retracing its steps, but has gone steadily forward to increase the efficiency of munition work by guarding the health of the workers.

## THE CONFERENCE SUMMONED BY THE DIRECTOR-GENERAL OF NATIONAL SERVICE.

THE conference called by the Director-General of National Service to consider the organization of the medical profession with a view to meeting the needs of the military and civil population in existing circumstances resumed its proceedings on March 15th, when all those mentioned as present on the previous day were again in attendance. It will be remembered that the subjects referred to the conference by Mr. Neville Chamberlain were whether the service to be given by members of the profession should be compulsory or voluntary; what arrangements should be made for the collection and distribution of fees, or other form of remuneration, in cases in which doctors left their own practices or took on the practices of others; what arrangements should be made, centrally and locally, for redistribution of medical men; and what should be the relation between any central, executive, or advisory body and the Department of the Director-General of National Service. The various matters arising out of these subjects were discussed, and certain resolutions adopted for submission to Mr. Neville Chamberlain. Until his views have been expressed we are not in a position to publish any further information.

## THE MEDICAL SERVICE OF THE ARMY.

ANY decisions which may be taken in consequence of the recommendations made by the conference held last week at the request of the Director-General of National Service

will not affect the immediate demand of the army for additional medical officers. This demand is large and urgent, and the Central Medical War Committee, at its meeting on March 21st, resolved to proceed with its proposal to make an appeal to unenrolled men between the ages of 41 and 45 to offer themselves for service in the Royal Army Medical Corps. In furtherance of this it proposes to communicate with local Medical War Committees, suggesting the number of men between these ages the particular area should be asked to supply for immediate service. We intimated a fortnight ago that this might have to be done, and added that it might possibly be necessary before long to extend the appeal to men between the ages of 45 and 50. Many such men, though they may not be physically fit to stand the hardships and privations of the trenches, or the front line of a mobile force, could probably undertake work such as not a few of their contemporaries are now doing at the base hospitals and on the lines of communication abroad; their services might also be utilized at base hospitals and with units at home, thereby liberating younger men for service abroad. We are well aware that the opinion is entertained by many civilian practitioners in this country that further economies in the employment of medical officers might be practised in the army. We believe that the necessity for economy is appreciated by the Army Medical Department, but it must be realized that the responsibilities of that department towards the army and the nation are very great. The military situation is full of uncertainties, but English and French experts appear to be agreed in believing that the summer of this year may witness very active operations which cannot but be attended by numerous casualties, with which the medical service must be prepared to deal.

## THE BACTERIOLOGY OF BACILLARY DYSENTERY.

OWING to the return to this country of many dysentery patients and convalescents during, and after, the autumn of 1915, the Medical Research Committee organized a system of investigation which involved bacteriological as well as protozoological inquiries. The results of the latter were published about a couple of months ago in a report noticed in our columns on January 27th. A report on bacillary enteritis has now been issued, founded upon the examination of 878 cases.[1] The bacillary investigations were carried out under the general direction of Professor William Bulloch, by Dr. L. Rajchman, Dr. G. T. Western, and Miss Collie, with the assistance of Captain T. R. Ritchie (N.Z.A.M.C.), at the London Hospital Medical College, and the help of Captain S. R. Douglas at St. Mary's Hospital. As the majority of cases upon which the report is founded were convalescent it was to be expected that the pathogenic agents would have decreased in number, or disappeared, before the examination took place, but to diminish error in the estimate of the nature of the epidemic due to this cause, the indirect method of serum examination was carried out in every case for the detection of a past infection. As the patients arrived in this country they were regarded in provisional diagnosis as only "dysenteric" in the general sense; it was not known either whether the "dysentery" was bacillary or amoebic, or whether it also included typhoid fever, paratyphoid fever, or other bacillary infections hitherto undetected. The object of the work now described was to determine the existence and frequency of bacillary dysentery and other bacillary infections of the typhoid-colon group, to determine the number of cases still infective, and by so doing to aid in controlling the further spread of the disease either in this country or in other territories to which the recovered patients might be sent. In each of the 878 cases, on at least one occasion an examination both of the excreta and of the blood serum was carried out. The examinations made were numbered in thousands, and have demanded great perseverance, accuracy, and a high degree of technical skill. The main results show that the Mediterranean epidemic of "dysentery" was highly complex. Both amoebic and bacillary infections existed side by side, or actually in the same individual, while a number of cases were not dysentery properly so-called, but paratyphoid fever, of which both varieties A and B were found; typhoid fever itself played no part in the epidemic. The actual frequency of the different infections was submitted to an exhaustive analysis so far as was possible from the data, but the figures reached represent the minimum number of those infected. In fact, true dysentery bacilli were found only in twenty-eight cases and paratyphoid bacilli only in twenty-seven. That these only represented a fraction of those actually infected is shown, however, by the serum reactions, in which 31.1 per cent. of all the cases gave a positive agglutinating reaction with *B. dysenteriae* Shiga and 11.1 per cent. with *B. dysenteriae* Flexner. The reaction was positive towards the two types A or B of paratyphoid bacilli in 32 per cent. of the cases.

[1] London: H.M. Stationery Office; to be obtained through any bookseller.

## ROYAL MEDICAL BENEVOLENT FUND.

THE annual meeting of the Royal Medical Benevolent Fund took place on March 13th, when Mr. J. H. Morgan, C.V.O., was in the chair. It was announced that Sir John Tweedy, who had held the office of president for ten years, during which time the Fund was incorporated and the Guild established, had resigned that office. A vote of thanks was passed to him, and Dr. Samuel West was elected in his place. During the twenty-two years of Dr. West's treasurership the number of annuities has been raised from 108 to 161, and the invested property has increased from £52,000 in 1896 to over £102,000. This excellent financial result is largely due to Dr. West's skilful management and his organization of the finances of the Fund on strict business lines. The meeting adopted a cordial vote of thanks to him for his services, and elected Colonel Charters J. Symonds, C.B., to succeed him as treasurer. Dr. G. Newton Pitt was re-elected honorary secretary, and Drs. Fawcett, Leonard Guthrie, and Colman, and Mr. Guy Elliston were added to the committee. The total subscriptions and donations for the year amounted to £2,067, a decrease of £176 as compared with the previous year. As the amount distributed in relief was £2,503, the sum of £360 had had to be withdrawn from reserves. The annuity department had expended £3,119, an increase of £91 on the previous year; the number of annuitants had been increased by twelve. In response to the war emergency appeal, the object of which was to assist medical men on their return from the war, about £4,000 was received. This, it was pointed out, was far less than would be required; many doctors, owing to the sudden call to naval or military duty, had to leave their practices inadequately provided for, and on their return will no doubt find them seriously impaired. The Fund is the only one of its kind in the profession, and it is expected that when its existence becomes more widely known demands made upon it will be heavy. In order to meet the requirements of such cases substantial sums will have to be granted. The services rendered by the medical profession in the war have established a claim upon the public which, it is hoped, the public will recognize by giving its liberal support to the Fund. An appeal is made to medical men to bring the Fund, and its needs, to the notice of well-to-do patients. The Royal Medical Benevolent Fund Guild continues its excellent work, details of which will be given in a report about to be issued.

## IRISH MEDICAL SCHOOLS' AND GRADUATES' ASSOCIATION.

THE annual general meeting of the above association, which has now 646 members, was held on March 17th (St. Patrick's Day) at Pagani's Restaurant, when Dr.

Jocelyn Swan resigned the Presidential chair to Surgeon-General Sir Launcelotte Gubbins, K.C.B., M.V.O. The fortieth annual report showed that the finances of the association continued in a flourishing condition and referred with pride to the large number of members who were serving their King and country, many of them, including the metropolitan honorary secretary, having been at the front since the beginning of the war. Regret was expressed at the loss sustained by the death of one of their warmest supporters, the late Dr. James Little of Dublin, and of ten other members, including an ex-president, Dr. Highgate H. Phillips-Conn of Waterford. It was announced that the Arnott Memorial Medal had been awarded to Captain John A. Linton, I.M.S., whose conspicuous gallantry in Mesopotamia had won for him the Victoria Cross. The festival dinner was held subsequently, at which upwards of seventy members and guests, the latter including a considerable proportion of ladies, sat down. The toasts which followed were proposed and responded to in commendably short speeches, the President, Sir Launcelotte Gubbins, before they were entered on, inviting those present to show in the usual way their sympathy with H.R.H. the Duke of Connaught in his recent bereavement. The health of the King was most heartily drunk, the whole company singing the National Anthem with enthusiasm. The toast of "Our Defenders," proposed by Dr. William Douglas, was responded to by Captain Leahy, R.A.M.C., who said that the home folk could scarcely realize how much the prospect of a hearty reception on their return to England, Ireland, or Scotland helped the boys at the front to bear their hardships. He himself, having been a prisoner for a long time, experienced this to the full, and all were very grateful for what was done to make their lot endurable. The toast of "Our Guests," proposed by Dr. Gubbins Fitzgerald, was responded to by Dr. William Hill. The President, in acknowledging the toast of his health, said he felt it a great honour to preside over an association which during the forty years or nearly of its existence had had in the chair men of the greatest eminence in the profession. He made an earnest and eloquent appeal to his Irish brethren to use their influence with those they came in contact with in England to look ahead and prepare every one for the great combat in which all should take their share when the present war was over. There were, he said, three formidable enemies to be fought—namely, tuberculosis, bad housing, and intemperance. The first could not be conquered until the second was got rid of. He would remind them of what had already been done to get rid of the second enemy in their own country, for no fewer than 47,000 comfortable cottages had been provided to meet the wants of the poorer peasants in Ireland, and to each was attached a quarter of an acre of ground. With regard to the third enemy to the health of the population in the poorer districts of the United Kingdom he would, though neither a teetotaler nor a prohibitionist, express a hope that the restrictions with regard to the sale of intoxicating liquors would be continued after the war to the great advantage of the health of the community. Evidence of how much had been done in the army of late years to lessen the evils of intemperance was to be found in the fact that out of 70,000 soldiers serving in India no fewer than 32,000 were teetotalers. Sir Launcelotte concluded by reference to the fine achievement just reported which their countryman, General Maude, had accomplished. The proceedings of the evening were enlivened by humorous songs and stories given by the Rev. Dr. Houston Collisson and by songs and violin playing by Miss Elsie Warner.

### TAXES ON UNOCCUPIED FURNISHED HOUSES.

THE legal position so far as income tax is concerned as to taxation of houses not actually occupied except that furniture remains therein seems to be as follows: Section 70 of the Income Tax Act of 1842 provides that all properties shall be assessed whether occupied or not, but that the assessments on houses shall be discharged for the period they are "unoccupied." The statute gives no definition of occupation, but in a case decided in 1904—Smith *v.* Dauney, 2 K. B., 186—a furnished house not dwelt in or slept in for the whole financial year was held liable to inhabited house duty as well as to income tax (Schedule A) and local rates. It would therefore seem that there is no legal claim to exemption on the ground of absence of occupation. As to the quantum of the assessment the ordinary rules would apply, and it would be determined by the rent paid for that or similar houses. In view of the difference which the inclusion of the rental value of the house in the individual's total income might have on the rates of income tax payable on the whole, it certainly seems that this result, however correct legally, inflicts a substantial hardship. Inasmuch as the house would in such circumstances serve as store for the furniture, the complete exemption of the property could perhaps hardly be expected, but some system of assessment on "storage value" in such cases would obviate an existing injustice, and we hope that the point will not be lost sight of when the Finance Bill for this year is being discussed in the House of Commons.

### THE DELINEATION OF INTERNAL ORGANS.

IN an article entitled "The delineation of internal organs by an electrical method," published in this JOURNAL in September last, an account was given of a device which at about that time was attracting some attention in the British Expeditionary Force. Information subsequently received seemed to justify us three weeks later in expressing the anticipation that we should be able to publish a full account of the method and results in an early issue. This expectation has not been fulfilled, and we have reason to believe that the inventor has failed to satisfy the physicists consulted as to the truth of his claims.

# Medical Notes in Parliament.

### Pensions for Soldiers and Sailors.

SEVERAL additions and improvements in the war pensions for soldiers and sailors were announced in the Commons debate on the warrant on March 19th. The principal controversy arose on the question of allowances for the "medically unfit" or broken down soldiers. The Government declines to recognize them for pensions, unless their disablement has been "aggravated in service" if not actually incurred in service. Under the warrant, however, such a man was to be eligible for a gratuity of not more than £100.

Mr. J. M. Hogge, in a general review of the scheme, repeated the demand that these men should be eligible for pensions. He recalled that 100,000 such men have already been discharged from the army, and reckoned that before the end of the war the discharges of men in this category would reach a quarter of a million. After his manner, Mr. Hogge had some caustic things to say about the different decisions of different medical boards. He mentioned the case of one of his friends, who, he said, had in November, 1915, been rejected by a medical board in Edinburgh as unfit even for home defence. Ten months later this man was again called up and passed as in Class B1. Then another medical board put him back to C2. In January last he was examined by a fourth board, which passed him for active service as A1. Mr. Hogge put it that in nine cases out of ten, if such a recruit broke down, the medical defence of the authorities would be that the man suffered from his troubles before he entered the army—it would not, according to Mr. Hogge, be admitted that they had been "aggravated by service." Mr. Hogge claimed to be able to produce cases of men who had fought in the war, and had nothing—not even the hundred pounds gratuity on their discharge as medically unfit.

Mr. Barnes (the Pensions Minister) gave an account of the new concessions to be made under the warrant, some of them arising out of the representations in the last debate. He spoke first of the case of a man, no longer totally disabled and not eligible for the highest degree of pension, who started work but had to attend hospital once or twice a week. If he lost time thereby or had expenses through the circumstance he would have an allowance up to 10s. a week. As for the gratuity question, Mr. Barnes said he was convinced that the hard cases quoted by Mr. Hogge referred to some time previous to February 15th. The man who had fought in the field and the man who had, it was said, been badly treated would be entitled

to a pension under the present warrant just as much as the man who had fought a year or more. The man the board had in mind for a gratuity was the man who might have been certified in an asylum, but had offered himself for service and was soon afterwards found to be insane; or he might be a man who was afflicted with syphilis, and who developed very soon some after-effects by reason of which he had to be discharged. Mr. Barnes next mentioned the case of a woman whose husband had died during the war and who had become incapable of supporting herself through a son being killed in the war. In such cases a pension of not more than 15s. a week would be allowed. Coming to alterations in the schedule fixing the amount of pension according to the nature of the disablement, Mr. Barnes said these matters had been largely left to the doctors, but the board had on its own initiative lowered the rate for the man who had lost both feet. The doctors had put him in the 100 per cent. category, but the board had reduced him to 80 per cent., but on representations from Roehampton had raised him again to the 100 per cent. class. Touching the treatment of blinded soldiers in Scotland, Mr. Barnes said he should be meeting the authorities of Edinburgh blind asylum in a week or two, but his information so far led him to believe that provision for the blind soldier could best be made by a central authority. He believed that St. Dunstan's could deal better with these men than any other institution in the country.

After further discussion, Sir A. Griffith-Boscawen (Secretary to the Pensions Ministry) made a further defence of the gratuity proposal for the medically unfit whose condition had not been aggravated by service. He quoted a number of cases in which the men had not done a single day's training. Wherever there was the slightest aggravation by military service a pension would be granted. With regard to the after-care of disabled soldiers, the minister said, in reply to a question, that Mr. Barnes was trying very hard to get that put on a systematic basis in every part of the United Kingdom. A Joint Committee had already been formed for Lancashire for the purpose of pooling facilities for treatment and training. Mr. Barnes and he were visiting Leeds to urge a similar scheme for Yorkshire, and were shortly going to Scotland for the same purpose, and they were quite prepared to take any steps they could to establish some national system for Ireland. They were prepared wherever facilities could be found for treating men in institutions to pay for their maintenance. It was the duty of the State, if proper institutions for the treatment, care, and training of disabled soldiers could not be found, to set them up. Existing institutions should first be used.

Before the close of the debate Mr. Bonar Law said the Government would raise the limit for the gratuity from £100 to £150.

## War.

*Contemplated Change of the Classification of Men in the Army.*—In the course of debate on Army Estimates in the House of Commons on Wednesday evening Mr. Macpherson (Under Secretary for War) hinted that a revision of classification of men in the army was contemplated. He understood that the suggestion was to reduce the three classes A, B, and C, to two, A and B, the first named to be for men fit for general service, and the second for those who were not. Mr. Macpherson acknowledged that some men in Class C had been sent to France, but only after medical examination of such men, and only on assurance by the medical authorities that the conditions in France were equal to those at home for them.

*Local Employment of Unfit Doctors of Military Age.*—In the Commons Colonel McCalmont asked Mr. Macpherson whether it was in accordance with the decision of the Army Council that a civilian doctor in Ireland appointed in medical charge of troops in his locality before the war, who, although of military age, had been found medically unfit for general service by a board, was to be forthwith replaced by another local civilian doctor of over military age; and, if so, upon what grounds it had been decided to penalize young unfit doctors; and whether this decision would apply to doctors who had become unfit for military service. Mr. Macpherson replied that this was in accordance with the wishes of the Central Medical War Committee that young doctors should not be employed at home as that prevented others from volunteering. Young medical men who were unfit were employed on general service at home and not locally. Colonel McCalmont asked whether local doctors could not be employed in their own locality. Mr. Macpherson answered that offers of local service could not be accepted; doctors must volunteer for service in any part of the Home Command.

*Woolwich Arsenal, Medical Department.*—Mr. MacVeagh asked whether the doctors in the medical department at the Woolwich Arsenal were under the jurisdiction of the Army Medical Department. Mr. Macpherson said that, so far as officers were concerned, appointments were made to the office by the Director-General. He believed that one or two women doctors had been appointed by the Arsenal authorities direct. Like the rest of the Arsenal, the medical department was not under the jurisdiction of the Director-General.

*Manipulative Surgery.*—In reply to questions by Mr. MacVeagh and by Mr. Buxton, Sir Worthington Evans (Secretary to the Munitions Department) said that Miss Wade Thompson (whose case was referred to last week) was not prevented from resuming work at Woolwich Arsenal because she had been treated by Mr. Barker. When she offered to return to work on February 13th she did not produce a certificate that she was fit for work signed by a qualified medical practitioner, as was required under the rules of the Arsenal. She was not paid for the fortnight (February 13th to 27th) during which she was not at work. Nothing was known at the Arsenal of any question being raised in Parliament until March 2nd. Miss Thompson had been working since February 27th.

**The Venereal Diseases Bill.**—On March 15th the third reading of this bill was moved in the House of Lords by Lord Rhondda and agreed to. The bill therefore goes down to the Commons without amendment, and, if given second reading there, will doubtless be referred to the Grand Committee which is now considering the Criminal Law Amendment Bill.

*Criminal Law Amendment Bill.*—The Grand Committee on the Criminal Law Amendment Bill was occupied at its sitting on March 15th with Clause V. Under the bill the age of consent would remain the same as under the principal Act—namely, 16—but it was urged in the Commons debate on the second reading that the proposal in the bill to sweep away the defence of "reasonable belief" that a girl was 16 would in effect extend the protection afforded by the law. Mr. W. H. Dickinson, however, submitted that the time had come for raising the age and also for disposing of the defence of "reasonable belief" as to this age, and moved an amendment accordingly. Mr. Herbert Samuel supported the amendment, but said that if the Committee wished to choose between raising the age to 17 or keeping it at 16 and ending the defence of "reasonable belief" it would be better to keep the age at 16. Mr. Rawlinson spoke against the amendment on the ground that it would lead to serious increase in blackmailing, and suggested that the seduction of youths needed to be remembered. Sir George Cave, for the Government, opposed the amendment. He said that if the Committee decided to raise the age to 17, he should feel obliged to move that the provision regarding "reasonable belief" should be retained, and if he were defeated on that point he should have to consider whether he would proceed with the bill. He had been informed that in 50 per cent. of cases of this sort submitted to juries acquittals were given. The reluctance of juries to convict was an element that should be borne in mind. On a division the amendment was rejected by 21 votes to 20, and after some further debate the clause was passed as originally submitted. Thus the age remains at 16, as in the principal Act, but the defence of "reasonable belief" left available under that Act is made void. At the sitting of the Committee on March 20th, Mr. J. W. Wilson presiding, the Home Secretary withdrew Section 4, which concerned the definition of brothels. The proposal was to amend by reference previous Acts so that the word "brothel" should be construed as if the words "or for the purpose of habitual prostitution" were inserted after the words. The order paper was relieved of a page of notices of amendments by Sir George Cave's decision. Clause V proposes an amendment of penalties in cases of conviction of brothel keepers, such persons to be liable, on summary conviction: (*a*) On first conviction to a fine not exceeding £100, or to imprisonment, with or without hard labour, for a term not exceeding three months; (*b*) on a second conviction to a fine not exceeding £250, or to imprisonment, with or without hard labour, to a term not exceeding six months; and (*c*) in the case of a third or subsequent conviction to a fine not exceeding £500, or to imprisonment, with or without hard labour, for a term not exceeding six months. Discussion took place on amendments by Mr. Dickinson to omit the alternatives of fines. The argument for punishing these offences only with imprisonment was that brothel keepers made large sums of money, and were not much deterred by fines. On the other hand, Mr. Dillon held that if the law were so framed it would be a terrible temptation to the police. A division was taken on the omission of the words as regards a first conviction, and Mr. Dickinson's amendment was rejected by 29 votes to 17. A second division took place with the same result in regard to later convictions. An amendment was afterwards moved by Mr. Samuel to give courts power not only to choose between the alternatives of fine or imprisonment but to impose a fine and to order imprisonment also. This was carried, the general opinion being that the twofold punishment would be awarded only in exceptionally bad cases. Sir George Radford moved the rejection of Clause VI, which proposed to amend the existing law as regards penalties for soliciting and loitering so that a court should have power to impose on a second conviction a month's imprisonment, with or without hard labour. He pointed out that injustice might be done by one corrupt police officer. Ladies engaged in rescue work thought there might be danger of this kind. Sir George Cave replied that a temptation was put in the way of the police whenever a fresh statute against crime was enacted. No offence could be worse than blackmail on the part of the police, and if any case of that sort were brought to his notice it would receive very serious consideration. He had hoped that the chief objection to the present clause was removed when the subsection in Clause II as to medical examination was dropped. Mr. Samuel recalled the exhaustive inquiry by a special Commission some years ago into the matter of solicitation, and its findings which completely exonerated the police from vague charges which had been put forward. On a division the clause was rejected by 16 votes to 15.

# THE WAR.

## TREATMENT OF ARTERIAL WOUNDS.

PROFESSOR ENDERLEN, in a communication on the treatment of arterial wounds[1] at the congress of surgeons in Heidelberg last year, said that ligature had been employed less frequently than might have been expected; for instance, it had been applied only in 201 out of 421 wounds reported by Rehn, pressure or plugging sufficing for the remainder. The subsequent history of these cases, as regards the occurrence of gangrene, secondary haemorrhage, and aneurysm, was not available. Hotz of Freiburg reported unfavourably on the after-effects of ligature; thus in six cases of ligature of the carotid, permanent unilateral paralysis followed in five, and in six ligatures of the femoral, popliteal, and axillary arteries gangrene supervened in four. Spontaneous healing of a completely perforated artery was observed occasionally. The fact had been established during subsequent operations on the nerves, and Enderlen had met with one instance in the carotid artery. If spontaneous healing did not take place, a pulsating haematoma or arterio-venous aneurysm developed and called for surgical treatment.

He strongly commended suture for wounds of arteries, though suitable opportunities for performing this operation were few. It should be performed early, for any marked induration of the tissues greatly increased the difficulties, so that even after eight days the isolation of the vessel was no longer a simple matter. Early suture had many advantages over other methods. The vessel could be readily isolated, its wall was not softened, ragged edges or ends could be trimmed or resected, and defects amounting to several centimetres could be reduced by flexion of the limb or filled up by venous transplantation. The increase of the haematoma and consequent injury to surrounding muscles and nerves was prevented, and the pressure of the blood effusion on the collaterals was got rid of. If thrombosis occurred, the closure of the vessel was gradual, as compared with ligature, thus affording time for the development of the collateral circulation. Early treatment had the further advantage that the danger of late haemorrhage during transport was avoided. Unfortunately, it was precisely in those cases most suitable for the operation in which the perforations were small that diagnosis was difficult, since pulsation and thrills were often absent in the early stages.

Suture was contraindicated if the patient were suffering from severe loss of blood; and if, on deferring the operation till the following day, the foot, in cases of wound of the femoral or popliteal artery, were cold, the operation was no longer of use. Only once was Enderlen able to save the limb after circular suture of the popliteal in cases of this kind. It was also contraindicated when the soft parts had suffered much laceration, since suppuration was then to be expected, and it was impossible to protect the sutured wound. In wounds of arteries the ligature of which would be followed by no untoward consequences suture would not be adopted. Early operation was to be recommended in pulsating haematoma from wound of the common carotid, of the brachial below the circumflex branch, of the femoral below the profunda branch, and of the popliteal artery.

Stabsarzt Professor Gebele[2] has reported on the results of operation in twelve cases of aneurysm from gunshot injury. Arterial aneurysms occurred less frequently than arterio-venous; of the six aneurysms of the latter kind which were operated on, four were indirect (varicose aneurysm) and two direct (aneurysmal varix). Other forms were the not infrequent arterio-venous fistula and a peculiar aneurysm arising after complete division of the femoral artery, in which the peripheral portion of the vessel became thrombosed, while the central portion communicated with the femoral vein through a large haematoma. Except in the rare cases in which spontaneous healing occurred, wound of an artery was followed by the formation of a haematoma; and in the course of two to three weeks the periphery of the effusion became organized into a fibrous sac. Gebele had observed haematoma in three cases; these appeared five days, seventeen days, and seventeen weeks after wounding, the haematoma in the last case evidently being due to late haemorrhage, caused by the rupture of a contused spot or distended scar. In two cases pulsation and intermittent murmur of arterial aneurysms, and the thrill and continuous murmur of arterio-venous aneurysms were not present, and aneurysm should always be suspected when a haematoma showed no signs of diminishing within eight to fourteen days from the injury. A swelling was noticed four times, three times with discoloration of the skin; a tense pulsating tumour three times. In five cases both swelling and tumour were absent. Paralysis of nerves was observed in five cases, in two from direct injury, in three from indirect. External haemorrhage occurred in three cases, internal haemorrhage in one.

It was important that a recently wounded vessel should be ligatured at the seat of injury and not at the site of election, otherwise a recurrence of haemorrhage might take place through collateral channels. Wounds of vessels associated with the formation of aneurysm should not at first be interfered with; and there was some difference of opinion as to the most suitable time after wounding for operation. Many surgeons recommended from two to five weeks, but in all cases it was desirable that the wound should have healed, since infection excluded resort to suture of the vessel. It was not true, as had been stated, that the difficulties of the operation increased with the lapse of time from the infliction of the injury. Gebele had encountered great difficulties from adhesions around a femoral aneurysm as early as seventeen days after wounding, and, on the other hand, complete absence of difficulties in a similar case after five months.

The choice of operation lay between the methods of ligature or obliteration and those of reconstruction. Ligature above and below the sac was followed by slitting up of the sac or its excision or obliteration. The application of a single ligature above or below the sac was an uncertain method, and could rarely be required. The danger of gangrene was present in all methods of ligature, and Wolff had stated that in 2,043 ligatures gangrene occurred in 233. The danger was lessened if the vein was ligatured at the same time as the artery, the large veins apparently draining the blood too rapidly from the limb. Wolff found that with simple ligature of the arteries gangrene occurred in 20.4 per cent. in the lower limb and in 7.8 per cent. in the upper; when the vein was ligatured at the same time it occurred in 9 per cent. and 0 per cent.

The methods of reconstruction or restoration of the continuity of the vessel were suture and autoplastic transplantation of a portion of a vein. Suture was regarded as the ideal operation for aneurysm. Small thrombi were deposited upon the sutures, but no serious thrombosis occurred in the absence of infection. In arterial aneurysm the sac was slit up, the clot removed, and the aperture defined and closed by lateral suture. In arterio-venous aneurysm the sac was excised and circular suture performed. Venous transplantation was not necessary in traumatic aneurysms, and it was at times followed by thrombosis. Extirpation of the sac should be avoided, as it was often the cause of gangrene; the sutures should not be carried above the aperture in the arterial wall. The necessity of venous transplantation in large defects could be avoided by flexion of the limb, careful isolation of the vessel, with preservation of the lateral branches, and approximation of the ends by means of clamps. It was important that the vessel should be kept moist with physiological salt solution during the operation of suture, since drying favoured thrombosis.

Gebele performed seven ligatures and five sutures—three lateral and two circular, one of these with venous transplantation; eight of the cases returned to the front, two were disqualified, one died. Although gangrene did not follow in any of the cases of ligature, suture was to be regarded as the ideal operation.

[1] Bruns's *Kriegschir.*, Heft 14, p. 677.
[2] Ibid., Heft 15, p. 35.

## HEALTH OF THE FRENCH TROOPS IN SALONICA.

FROM an account of the arrangements made for the protection of the health of the French troops in Salonica which appeared not long ago in the *Annales d'hygiène publique* we learn that in October, 1915, local laboratories for bacteriological diagnosis, water analysis, and general hygienic purposes were established under the

direction of members of the staff of the Pasteur Institute. A sanitary council, composed of French and Greek physicians, was appointed at Salonica to look after the health of the civil population and the troops living among them. Sanitary squads under the direction of a medical officer were formed; among their functions were the inspection of kitchens, the protection of food from flies, the incineration of refuse twice a day, the cleansing of latrines, and the removal of manure. Instructions as to the prevention of epidemics were gummed into the *livret* of every soldier. The most serious disease against which precautions had to be taken was malaria, which often occurred in the pernicious form. Thousands of mosquito nets were provided, fine network screens were placed in doors, windows, etc., and the men were given a pomade for the mechanical protection of the skin, especially the hands, as the mosquitos easily made their way through gloves. By the end of July, 1916, 12,000 kilos of quinine in tablets and 384,000 phials of quinine in solution for injection had been sent out, and similar consignments were repeated. The worst ravages of malaria occurred in the Vardar valley, where the Expeditionary Force at first chiefly operated.

In reply to representations by the sanitary service the general in command said that for strategical reasons it was necessary that the troops should remain there for several months. Prophylaxis was inefficiently carried out, the French soldier being unaccustomed to such precautions; many did not use the quinine served out; there was imperfect supervision on the part of the officers, and attacks of malaria passed as gastric disturbance accompanied by fever. The epidemic reached its height about the middle of July, 1916, when the temperature was about 120° F. in the shade, whilst military exigencies still made the laying out of roads and the digging of trenches necessary. Notwithstanding this, only one-fifth of the French troops were affected, and the large majority of the cases were mild. When the troops were moved to high ground, epidemic diseases became rarer and less severe. All the men were vaccinated against typhoid and cholera; those who had undergone antityphoid vaccination more than a year previously were revaccinated with triple vaccine (T.A.B.). Some cases of typhoid occurred, almost all of a mild type. An outbreak of typhus was feared, but, thanks to the precautions taken against lice, only two cases were reported; the troops were accompanied by special ambulances provided with douches and stoves for the disinfection of clothes. Although plague was prevalent in neighbouring countries, no case occurred among the French troops. In view of a possible importation of the disease, bacteriological examination of rats was made in a special laboratory at Salonica. Precautions were taken against the introduction of disease by prisoners, especially Bulgarians, as the sanitary condition of King Ferdinand's army left much to be desired. The evacuation of the sick and wounded was well organized; the number of available beds in the hospitals behind the fighting line was more than sufficient for requirements. Outside the Salonica region transport was more difficult, as in the hilly districts the patients could be carried only in barrows, or in baskets slung on the shoulders. The sanitary formations were provided with automobiles and a completely equipped train. The wounded were sent home in hospital ships, of which France at that time had seven, all well fitted out for the purpose.

## EPIDEMIC JAUNDICE OF CAMPS.

THE occurrence of a form of epidemic and endemic jaundice in the western sector of the Italian front was recorded last year by Professors Frugoni and Cannata, as was detailed in the BRITISH MEDICAL JOURNAL of June 3rd, 1916, on page 800. A further communication on the same subject has recently been published[1] by Professors Frugoni, Gardenghi, and Ancona, containing a vast amount of clinical and pathological observations, based on the investigation of sixty-eight cases of this form of jaundice, and of seven other patients who had suffered from it from two to four months previously. A clinical picture of this Italian form of epidemic camp jaundice will be found in the reference given above, and it will not be reproduced here. The very complete pathological investigations of the three professors, however, may be briefly analysed and summarized as follows: In three of the patients the *B. paratyphosus* B was isolated from the blood, in eighteen it was found in samples of the bile collected by the passage of Einhorn's duodenal sound, and in seventeen it was cultivated from the faeces, which also gave growths of *B. paratyphosus* A in two instances and of Gaertner's bacillus in one. In all, over 35 per cent. of the sixty-eight patients with jaundice were shown to be infected with paratyphoid B or A bacilli. Many of the patients gave positive agglutinating reactions (dilution 1 to 100 or 200) with these bacilli. The conclusion reached is that about a third of the patients were definitely infected with paratyphoid organisms, which, no doubt, were inhabiting the bile ducts, and might be still excreted in the faeces two or three months after the attack of jaundice was over. What of the other two-thirds of the patients? Reasons are brought forward for believing that in some of these the infecting agent was *B. coli* or one of its congeners, and in others the Japanese *Spirochaeta icterohaemorrhagiae*. Four of the patients died, two being cases of paratyphoid B infection; in all four the bile ducts were pervious, the gall bladder normal, and the liver reduced in size and similar to the liver of acute yellow atrophy. Having made elaborate analyses of the gastric contents of many of their jaundiced patients, the authors show that hypersecretion of the gastric juice with hyperchlorhydria and diminished secretion of pepsin are common in epidemic camp jaundice. Examination of the blood proved an increase in the resistance of the red cells to haemolysis while the jaundice lasted.

Following up the histories of their patients, the authors found in six of them the notable development of a peculiar sequela. This they entitle "chronic residual hyposuprarenalism" (the name is theirs not ours), a condition characterized by a high degree of general weakness, Addisonian pigmentation of the skin and mucous membrane of the mouth, a feeble vasoconstrictor reaction and absence of true glycosuria on the injection of adrenalin, absence of alimentary glycosuria, and a conspicuous lymphocytosis. This syndrome might present itself soon or late after the attack of jaundice, and might develop more or less completely. It was attributed to the action of three factors—namely, the jaundice itself, the exhaustion produced in soldiers by the stress of service, and the formation of toxic substances. Other but less complete examples of this sequela were noted among the patients, and are referred to as instances of the "incomplete similaddisonian syndrome." In their experiments upon animals the authors did not succeed in reproducing the pictures of either the camp jaundice or the defective suprarenal activity.

[1] *Lo Sperimentale*, Florence, 1917, lxx, 587-695.

## PREVENTION OF GUN DEAFNESS.

DISCUSSING the various methods of protecting the tympanum from the concussion of explosions, Dr. A. Eysell[1] criticizes unfavourably the two devices most commonly in use. Opening the mouth and putting a finger into each ear are effective only when an explosion is anticipated. An unexpected explosion does not allow time for these precautions. Cotton-wool is useless, for it affords no effective protection to the tympanum, and many of the patients treated by Dr. Eysell for extensive laceration of the tympanum stated that they had always used plugs of cotton-wool. He described a small plug he has devised which, he says, can be worn for many hours without discomfort. Its main feature is that it contains a cavity guarded by a metal valve, which transmits ordinary sounds, but closes automatically when the atmospheric pressure is raised by explosions, the greater the concussion of the explosion the more effective the closure. It may be added, however, that at a recent meeting in Germany, at which concussion wounds of the tympanum were discussed, it was authoritatively stated that no satisfactory device had yet been found to prevent this and allied injuries.

[1] *Muench. med. Woch.*

## CASUALTIES IN THE MEDICAL SERVICES.

### ARMY.

*Died of Wounds.*

Lieutenant-Colonel M. L. Williams, Australian A.M.C.

*Died on Service.*

LIEUTENANT-COLONEL S. W. HEWETSON, C.A.M.C.

Lieutenant-Colonel Samuel William Hewetson, of the Canadian Army Medical Service, whose death was announced in the BRITISH MEDICAL JOURNAL of March 17th, died at the Royal Free Hospital, London, after an operation, on March 6th. He was formerly in practice at Calgary.

*Killed.*

Staff Nurse M. S. Dewar, Q.A.I.M.N.S. Reserve.
Staff Nurse M. Marshall, Q.A.I.M.N.S. Reserve.

*Wounded.*

Captain S. J. Linzell, R.A.M.C.
Captain G. D. Newton, R.A.M.C. (temporary).
Captain G. W. Rogers, R.A.M.C.(T.F.).
Captain E. A. Sanbrook, Australian A.M.C.
Lieutenant E. R. Daboo, I.M.S. (temporary).
Staff Nurse D. E. Dobbs, T.F. Nursing Service.

*Prisoner of War.*

Captain R. C. Clifford, I.M.S.

DEATHS OF SONS OF MEDICAL MEN.

Collins, Charles Bury, D.S.O., Colonel Royal Engineers, son of the late Dr. J. C. Collins of Stroud, died of cerebral malaria on March 1st. He was born on November 24th, 1867, educated at Wellington, and got his first commission in the R.E. from Woolwich on February 18th, 1886, becoming captain on October 7th, 1896; major on November 4th, 1904; lieutenant-colonel on April 19th, 1913; and colonel on April 13th, 1916. He had been successively assistant instructor and chief instructor at the School of Submarine Engineering, and at the time of his death was a deputy director of works, graded as chief engineer.

Downes, Howard Grey, second lieutenant Royal Engineers, only son of Dr. Howard Downes of Hornsey, killed March 12th, aged 23. He was educated at the Stationers' School and at Northampton Polytechnic Engineering School; joined the London University O.T.C. in August, 1914; was gazetted to the R.E. in June, 1915; went to the front in May, 1916; and was wounded on October 1st, but remained on duty.

Riddall, John George, Private Royal Scots, the 1st Foot or Lothian Regiment, second son of the late Dr. Riddall of Ayr, reported missing on July 1st, 1916, and now presumed killed from that date.

Ross, Ronald Maynard, Second Lieutenant Worcestershire Regiment, youngest son of Dr. Douglas M. Ross of Brighton, killed March 4th, aged 21.

Smith, J. Alan Tennyson, Lieutenant Royal West Kent Regiment, killed in action, aged 20, was the son of Dr. A. Tennyson Smith of Orpington. He was educated at Dulwich College, and matriculated at the University of London at the age of 16. He was going in for the medical profession, and had passed the first and a part of the second professional examinations for the M.B.Lond. He was fond of outdoor sports, and held his colours for football and cricket, and was captain of boxing in his own college, which he represented in the schools' boxing competition at Aldershot in 1914. He was company sergeant-major of the Dulwich College O.T.C., and retained his membership with the 1st Orpington Troop of the Boy Scouts, in which movement he took great interest. He received his commission in June, 1915, and in December was posted as officer-in-charge of his battalion machine guns. After spending a short time at Aldershot he went to France last May. He was wounded in June in the thigh and arm by shrapnel, but rejoined his battalion in time to take part in the battle of the Somme, and was mentioned in dispatches.

Umney, Cecil Francis, Second Lieutenant Dorset Regiment, elder son of Dr. W. F. Umney, Sydenham, aged 20, reported missing on September 26th, 1916, but now known to have been killed in action on that date. He was educated at The Hall, Sydenham, and Dulwich College. After matriculating at London University, he began the study of pharmaceutical chemistry. He obtained a commission in June, 1915, and was killed leading his men in an attack in the Somme offensive.

## NOTES.

EDUCATIONAL FACILITIES FOR BRITISH PRISONERS OF WAR.

AT a representative and largely attended conference of examining bodies in Great Britain, held on March 15th at the Board of Education, under the presidency of Mr. A. T. Davies, C.B., Chairman of the British Prisoners of War Book Scheme (Educational), it was unanimously decided, on the motion of Sir Edward Busk (University of London), to approve proposals for the encouragement and recognition of the studies pursued by prisoners during their internment. Various examining bodies (including most of the universities) have intimated their willingness to recognize work done and examinations passed in the camps, and to extend to the men on their return facilities for sitting for examinations under conditions which will take account both of their special circumstances and their needs. A message was read from the President of the Board of Education in which Mr. Fisher expressed sympathy with the objects of the conference and his belief that the result of its efforts would prove a great encouragement to the men to use wisely and well the time of their captivity, and, further, would be of material assistance to them on their return to this country. It is intended that the decision arrived at shall be communicated as soon as possible as "a message of encouragement and hope" to the various internment camps in enemy and neutral countries. Meantime it was suggested that friends and relatives of student prisoners might do them a service if, when writing to them, they would draw their attention to the steps in this connexion which are being taken on their behalf.

HONOURS.

The following medical officers are among the recent recipients of honours and awards for distinguished service in the field in Mesopotamia:

*D.S.O.:* Captain Allan Watson, M.B., R.A.M.C.

*Military Cross:* Temporary Captains John Low, M.B., R.A.M.C., Charles O'Brien, M.B., R.A.M.C., and Temporary Lieutenant A. Yeshwant Dabholkar, I.M.S.

The King of Italy has conferred the Order and Medalgia of Officer of the Crown of Italy upon Fleet Surgeon Robert Hughes, R.N., and Staff Surgeon Thomas W. Myles, F.R.C.S., R.N., for distinguished service during the war.

*Operations in Gallipoli.*

A list of officers who fell in action or died of wounds has been brought to the notice of the Secretary of State for War by General Sir Ian Hamilton, G.C.B., for distinguished and gallant service during the operations in Gallipoli. The names should be included in the list of mentions published in the *London Gazette* of November 5th, 1915. Among the officers mentioned is Captain M. F. Reaney, I.M.S.

# England and Wales.

THE London County Council has resolved that the administration of Part I of the Children's Act, 1908, which deals with infant life protection, shall be transferred to the Public Health Department, believing that, having regard to the important public health aspects of the matter, the work of inspection should be entrusted to the medical officer of health. It has also decided that the work of the County Council under the Midwives Act should not be delegated to the borough councils.

CENTRAL MIDWIVES BOARD.

Special meetings of the Central Midwives Board were held on March 13th and 14th for hearing penal charges against twenty-four midwives; Sir Francis Champneys was in the chair. Sixteen of the women were struck off the roll. In eleven cases the charges were concerned with neglect of ophthalmia neonatorum. Other grave charges included negligence in cases of puerperal fever and serious rupture of the perineum. Two of the women struck off had been convicted and sentenced at the Central Criminal Court to twelve months and six months' imprisonment respectively, and another had been convicted and fined for using obscene language.

At the monthly meeting on March 15th, Sir Francis Champneys presiding, the Board considered a letter from the Local Government Board with reference to the question of a limited delegation by a county council to an urban district council within its area having a population of not less than 20,000. The Central Midwives Board adopted a reply, in the course of which it was pointed out that the locality in which the question was originally raised contained 124,580 inhabitants in 1911, a population which had in other instances been held to justify elevation into a county borough, but that the delegation of the power of inspection of midwives was to be regretted; the Departmental Committee had reported against it, and the amending bill proposed to repeal the power which was not given in the Scottish Act. The Chairman was requested to communicate with the Privy Council asking that some relief might be afforded in respect of the heavy expenses incurred by the country members in attending Board meetings owing to the large increase in railway fares.

### THE REPORT OF THE BOARD OF CONTROL.

The second annual report of the Board of Control deals with lunacy and mental deficiency during the year 1915.

On January 1st, 1916, the number of notified insane persons under care in England and Wales was 137,188, a number less by 3,278 than that recorded on January 1st, 1915. This is remarkable as being the first occasion since 1859 (when reliable statistics first became available) on which a decrease as compared with the previous year has been noted; in fact, for the ten years ending 1914 an annual average increase of 2,251 registered lunatics had occurred. The Commissioners remark that "it is natural to infer that the diminution is only temporary, and bears some relation to exceptional conditions—social and economic—arising from the war with which it coincides." Later they suggest a possible explanation in such conditions as withdrawal from civil occupations of so many males, the demand for female as well as male labour, and the consequent increase in material prosperity. On the other hand, the direct influence of war in "disturbing mental balance in those actively engaged in it," and stress of anxiety in their relatives, must not be lost sight of; and it is noted that an increased death-rate in the asylum population, as well as a diminished admission rate, is a factor in the decrease recorded during 1915. Deaths in county and borough asylums alone in 1915 exceeded by 2,116 those recorded in 1914, the death-rate rising to 12 per cent. from the previous quinquennial rate of 10.1. A corresponding heightened death-rate has prevailed in the Metropolitan District Asylums, the percentage for 1915 having been 13.97 as compared with 11.15 in 1914. During 1915 there had been a considerable increase in the asylum deaths from dysentery, influenza, pneumonia, enteric fever, and phthisis. The total average weekly cost per head for all county and borough asylums (11s. 1½d.) showed a rise of 4d. on the previous year, the total rise amounting to 9¾d. since 1913.

As regards mental deficiency, less elaborate statistics are given, probably because the carrying out of the Act has been greatly retarded by the war. Voluntary local associations have, however, accomplished much valuable preliminary work in conjunction with the "Central Association for the Care of the Mentally Defective," through which State grants in aid have been made. The training of attendants and instructors in institutions has also been taken in hand by the Central Association. The work of the voluntary institutions is commented on at some length, and an account of some of them will be found in the SUPPLEMENT.

### BOROUGH OF HOVE CHILD WELFARE CENTRE.

A child welfare centre has been opened recently in the borough of Hove. Its management has been placed under the direction of Dr. Rawdon Wood, the acting medical officer of health, who is largely responsible for its foundation. The work undertaken is that common to all child welfare centres—namely, the periodical examination of babies and young children as to their weight, nutrition, and general progress. Once a week the mothers are invited to bring their babies for inspection. The infants are weighed and examined, and if any disorders of digestion or nutrition are discovered advice is tendered, and simple medicines such as cod-liver oil or malt given. If any definite disease is discovered the mother is referred to the hospital for treatment. The parents are given advice as to the proper method of bathing, clothing, and feeding their children, as to the benefits of fresh air, cleanliness, and sleep, and as to the evils of dirt, flies, tube bottles, and "comforters." In connexion with the centre a voluntary aid committee supplies food for necessitous nursing mothers, and also hospital letters, instruments such as trusses, and general advice and assistance. The committee has a clothing club, and is in close touch with other associations for women.

The attendances vary from thirty to sixty, and the mothers all seem to take the greatest interest in the progress of their offspring. The afternoons are made as pleasant as possible by the director of the centre, who is assisted by Miss Ada Hipkins and a staff of voluntary workers. They keep the record cards, help the mothers to dress and undress the babies, keep order in the consulting room, receive visitors, and do generally useful work.

Exhibits are arranged of infant clothing; needlework and the cutting out and making of garments are taught. Tea is served at a trifling cost, and the mothers seem to enjoy their afternoons. Unfortunately, here, as in all other such centres, it is the mothers keenly anxious for the welfare of their offspring who attend. The very class of mothers it is most desirable to reach, those who from ignorance or indifference are improperly feeding or managing their children, are conspicuous by their absence. No scheme has yet been devised to get hold of this class, but it is hoped that the influence of such centres may gradually filter downwards and reach those for whom, after all, they are most needed. These remarks are in no way intended to belittle the most excellent work done at this centre, which is undoubtedly improving and later will still more improve the average standard of nutrition and health of the children of the borough.

In connexion with the centre a course of twenty lectures had been arranged on child welfare and the hygiene of child life and school life by Dr. Rawdon Wood, Dr. L. A. Parry (School Medical Officer), Dr. Helen Boyle, Miss Hipkins (Health Visitor), and Mr. Herriot (Sanitary Inspector). The course is intended primarily for health visitors, school nurses, and workers in child welfare, but medical practitioners, sanitarians, and others engaged in public health are invited. The centre is recognized by the Royal Sanitary Institute, and the lectures cover the whole course required for its examination for women health visitors, tuberculosis visitors, school nurses, and school teachers. The lectures have so far been most successful, many having to be refused admission. Probably they will shortly be repeated.

### VENEREAL DISEASES: PUBLICITY ARRANGEMENTS IN LONDON.

At the meeting of the London County Council on March 20th the Public Health Committee recommended that in dealing with the publicity arrangements under the scheme for the diagnosis and treatment of venereal diseases, the Council should confine itself for the present to disseminating information among persons who held positions of responsibility. The Council agreed to a motion that the National Council for Combating Venereal Diseases should be permitted to exercise such of the County Council's powers for disseminating information under this scheme as related (1) to the free distribution of literature in connexion with conferences to be held in each metropolitan borough, and (2) to the provision of lecturers and syllabuses for instructing social workers in association with such conferences. It was understood that a sum not exceeding £300 should be contributed for this purpose.

### THE PREVENTION OF TUBERCULOSIS IN LONDON.

At a drawing-room meeting held at 34, Queen Anne's Gate, Westminster, on March 21st, when Lord Glenconner was in the chair, Dr. F. N. K. Menzies, principal assistant medical officer of the London County Council, gave a lecture on the prevention of tuberculosis, the third of a series on social subjects arranged by the Charity Organization Society. The incidence of the disease, he said, had declined by 50 per cent. during the last half-century; this was due, first, mainly to the improved sanitation of dwellings and workshops, but also to improved nutrition and the general rise in the standard of living. It was only when the housing side of the problem was tackled that much further progress was likely to be made. There were, he said, eleven Central Fund dispensaries in London at the present time, many borough or municipal dispensaries, and a few dispensaries, also under the control of the council, but attached to a hospital. Two boroughs, Bethnal Green and Hammersmith, had no dispensaries. The number of beds made available for children under the London County Council scheme had been largely increased even during the war, and all demands for uninsured adults, with whom alone the London County Council was concerned, had been met with the minimum of delay. Nearly thirty tuberculosis care committees were working in London, and it was hoped that before long every part of the metropolis would be covered. There were at present two open-air schools, both on the south side of the river; it was hoped that their number would be increased; to them would be sent the "pre-tuberculous" child. It was also hoped to establish at least four or five dispensary schools, attached more or less definitely to the tuberculosis

dispensary, so that the children could get education and treatment at the same time. The next development was in the nature of more definite provision for persons in an advanced stage of the disease. To each dispensary should be attached a home for such sufferers, to be looked after by the dispensary medical officer, and to be used for those cases which the officer picked out as requiring isolation. Later on it was hoped also to develop farm and garden colonies as had been done in Edinburgh.

### Cancer Hospital, London.

The annual report for 1916 showed that 793 new in-patients were admitted, an increase of 20 on the previous year, and that the new out-patients numbered 1,519, an increase of 95. The number of operations performed was 541, of which 227 were abdominal. The percentage of deaths within three weeks of operation was 4.8. Colonel J. W. Webber, who presided at the annual meeting, said that many military cases had been sent to the hospital for treatment, especially in the electrical department. The research department had conducted some important investigations, but the results were not ready for publication. The female staff had voluntarily accepted a reduction in the meat ration from 7 lb. to 2½ lb. a week. In acknowledging a vote of thanks to the medical staff, Dr. Charles Ryall, Chairman of the Medical Committee, said that though no hospital had suffered more by the depletion of its honorary medical staff, it had been possible to give efficient service. Speaking as a member of the Reference Committee under the Military Service Act, which endeavoured to prevent the efficiency of the hospitals in the metropolitan area being diminished while providing officers for the R.A.M.C., he said that the increasing demands of the army were causing a rapid diminution in the ranks of the civil medical profession. The public had had to accommodate itself to a meat and a sugar ration, and was now on the eve of a "doctor ration." It was only by taking stock of the available men and pooling resources that it would be possible to carry on the work of the hospitals and safeguard the health of the community.

### Queen Charlotte's Lying-in Hospital.

At the recent annual meeting of governors it was reported that the number of patients admitted to the wards in 1916 had increased to 2,075 as compared with 1,817 in 1915; and 2,058 had been attended at home by the hospital midwives. Of the in-patients 407, and of the out-patients 911, were the wives of soldiers and sailors. In order to cope with the increasing work of the antenatal department, a new (temporary) out-patient department had been opened adjoining the hospital, and a physician (Miss Frances M. Huxley, M.D.) had been appointed in charge. An infant consultation centre was also being opened, and a physician (Miss Margaret G. Thackrah) appointed in charge. The number of emergency cases admitted had been greater than ever. Last year there were 183, many of them being admitted in a grave condition. The work had been carried on under difficulties due to a shortage of nurses, but the training school had well maintained its reputation.

## Scotland.

At a meeting in Glasgow, under the auspices of the corporation, it was resolved to form a local centre of the National Council for Combating Venereal Diseases. The meeting was addressed by Sir Francis Champneys, and the motion to form the local branch was moved by Dr. Ebenezer Duncan and seconded by the Rev. Professor Cooper.

### Vital Statistics of 1916.

A preliminary statement on the vital statistics of Scotland in 1916 published by the Registrar-General states that the birth-rate in that year was 22.8 per 1,000, the lowest yet recorded, and 12.8 below that for 1876, when the rate attained its maximum. The marriage-rate was 6.5 per 1,000, which was 1.1 below that for the previous year, 0.6 below the mean of the rates for the preceding five years, and 0.5 below the mean of those for the preceding ten years. The death-rate was 14.6 per 1,000, which was 2.5 below that for the previous year, 1.1 below the mean of the rates for the preceding five years, and 1.3 below the mean of those for the preceding ten years. It was the lowest rate ever recorded for Scotland. The infantile mortality-rate was 97 per 1,000 registered births—nine less than the previous lowest infantile mortality-rate recorded in Scotland—that for 1912. Comparing the birth and death rates in urban and rural areas, it is shown that in the larger burghs taken collectively the birth-rate was 23.2, and the death-rate 14.9. In the smaller burghs the birth-rate was 21.8, and the death-rate 15.0. In the county districts the birth-rate was 22.8, and the death-rate 13.8.

### Mobilization of the Profession.

A meeting of registered medical practitioners in Glasgow and the West of Scotland will be held in the Faculty Hall, St. Vincent Street, Glasgow, on Tuesday, March 27th, at 4.30.

The opinion of the medical profession will be invited upon the following points:

(*a*) Does the meeting approve of the principle of the immediate and compulsory mobilization of the whole nation (due regard being paid to age, training, and circumstances), to secure the successful and rapid conclusion of the war?

(*b*) Does the meeting approve of the medical profession being so mobilized in advance of the community?

(*c*) If the medical profession is to be mobilized, is the meeting satisfied with the arrangements which already exist, centrally and locally, for the redistribution of medical men, and for administrative purposes generally?

### Maternity and Child Welfare.

The Scottish Travelling Exhibition of Maternity and Child Welfare Work was in Glasgow last week. Dr. Leslie Mackenzie, medical member of the Local Government Board, in opening it, said that it had been shown in a number of towns since it was first opened in Keith last August. From Glasgow it would go into Lanarkshire, and then to the west and south of Scotland. It had everywhere been welcomed. Sir Donald MacAlister said that the reports on the subject prepared by experts for the Carnegie United Kingdom Trust would be issued very shortly. They would, he felt sure, impress the public with the magnitude and complexity of the problem.

At a conference held in connexion with the exhibition a paper on the Midwives (Scotland) Act by Sir Halliday Croom was read for him by Dr. Haig Ferguson. A discussion on the Notification of Births Act was opened by Dr. Leslie Mackenzie. Dr. Maxwell Williamson dwelt on the value of properly kept records showing the districts of a town in which special provisions were required to meet the circumstances which led to the loss of child life. In reply to a question he said that the infantile death-rate in Edinburgh was almost in exact proportion to the number of licensed premises in the different districts, and Professor Hope said that the experience of Liverpool was very similar.

At a meeting under the auspices of the Scottish Federation of Mother and Child Welfare Centres, Dr. A. K. Chalmers, M.O.H. Glasgow, who presided, said that the Federation established a year ago now included thirteen associations. During the discussion it was urged that the medical supervision of school children should be under the direct control of the medical officer of health, and not of the School Board, and Dr. Leonard Findlay said that research was ahead of legislation in respect of the effect of bovine tuberculosis on children. A discussion on the relation of general practitioners to welfare centres and the problem of home visitation was raised by Dr. Chalmers. Dr. Michael Dewar (Edinburgh) contended that some of the welfare schemes proposed would mean unfair exploitation of the medical profession. Dr. Drever, secretary of the Glasgow Local Medical Committee, thought that as the State had admitted its liability for the mental training of the citizen it should provide medical attendance and treatment for every one.

# Ireland.

The Central Babies' Clubs' Committee, an organization working under the Women's National Health Association, has forwarded a resolution to the Local Government Board pointing out that the mortality among nurse children in Dublin is exceedingly high, and asking that persons desiring to take children to nurse should be compelled to register.

The Rathdown Board of Guardians has instructed its solicitor to apply for a mandamus against the Local Government Board, which has refused to sanction the appointment of a temporary medical officer of military age.

The epidemic of measles, which exists in some parts of England, prevails to so serious an extent in Dublin that nearly all the infants' schools have been closed, in accordance with the request of Sir Charles Cameron, M.O.H.

The Irish Automobile Club and Wounded Soldiers.

The report of the Irish Automobile Club's Ambulance Transport Service states that it now consists of fourteen ambulances carrying fifty-six regulation army pattern stretchers, and six ambulances carrying twelve regulation army pattern stretchers, or a total carrying capacity of sixty-eight stretchers. The decision of the military authorities to use only the regulation stretchers for unloading hospital ships had rendered it impossible to continue to make use of vans kindly lent by Dublin traders, as they were too short to take the army pattern stretcher. During the year covered by the report fifteen hospital ships had been met and 3,924 cases transferred to Dublin hospitals. Members and non-members of the club attended with their touring cars on every occasion, and assisted in transporting the sitting-up cases to hospitals. The total number of wounded soldiers carried by the ambulance service for the year was 12,640, exclusive of the rebellion period, and not including men carried in private cars. Having dealt with the work of the association during the rebellion period, the report recorded services in connexion with recruiting for the mechanical transport section of the Army Service Corps, the Wounded Soldiers Reception Committee, and for the provision of comforts and entertainment for soldiers.

# Correspondence.

## FOOD REQUIREMENTS OF CHILDREN.

Sir,—In the admirable series of recommendations on rationing and "how to save food," recently issued by the Controller, there are certain recommendations with regard to the diet of children that appear to call for revision. The recommendations of the Controller are based on the following statement: "Children need plentiful food. A child of 8 needs half as much as a grown-up; a child of 12 three-fifths as much; a girl of 16 needs as much as her mother, and a boy of 16 may eat as much as his father."

I am aware that this represents the teaching of standard textbooks on the subject, though I have never been able to ascertain the exact data on which the original recommendation by Atwater was founded. I venture to think, however, that this teaching is wrong, and is to be deprecated as a guide at the present time. My opinion is based both on practical observation and special investigation. The food requirements of a healthy schoolboy, say of 12 years, can be fairly accurately gauged from observation and a comparison with those of his parents on the same régime. If this test be applied, it can, I think, safely be said that the average boy of 12, in a household of the professional class, eats as much as his father. Corroborative information is obtained from the laboratory standpoint. Some time ago I made a detailed study of the actual amount consumed by healthy children in a series of medical families, every precaution being taken to ascertain the exact amount of food consumed. The ages of the children ranged from 4 to 6 years. The result showed a daily average of:

| | |
|---|---|
| Protein ... ... ... ... ... | 71 grams |
| Fat ... ... ... ... ... | 67 ,, |
| Carbohydrates ... ... ... ... | 198 ,, |

Total calories, 1,725.

The supply of protein—the main food element in the dietary of children—consumed by a child of 6 years and under is shown to be greater than that allowed for by the Controller for a boy of 12.

Fully grown subjects may with safety and positive advantage to health accept the standard laid down for the average adult by the Food Controller. It is, however, not advisable to restrict the feeding of children to the extent indicated in the Controller's recommendations. A wise economy in regard to the feeding of children should be looked for in the selection of foodstuffs rather than in a reduction of quantity below the pre-war standard.—I am, etc.,

Edinburgh, March 17th. Chalmers Watson, M.D.

## THE PROPHYLAXIS OF VENEREAL DISEASE.

Sir,—Some of the remarks made by Dr. T. C. Mackenzie and others in the course of the correspondence on this question seem to show that there is still considerable misconception concerning the chief point at issue between the advocates and the opponents of the use of prophylactic applications. The real question is tersely and clearly stated and irrefutably answered by your correspondents, "A Medico-Legal D.P.H." and Mr. Arthur Cooper, in the Journal of March 10th. Dr. Mackenzie, however, erroneously assumes that those who hold it to be the duty of a medical practitioner to spread the knowledge of effectual preventives against *venereal infection* by all means in his power, are ignoring the value of all other attempts, whether of morally persuasive or coercive nature, to diminish the evils of indiscriminate *sexual intercourse*. Nothing that I or, as far as I know, any others who have taken part in this correspondence have said justifies this implication. There is, therefore, no point at all in Dr. Mackenzie's suggestion that "if Sir B. Donkin and Mr. Elliot leave alcohol out of their scheme of scientific prophylaxis they will be disappointed in the results." Most people know, whether they be medical or not, that alcohol is a frequent excitant of sexual desire, but the consideration neither of this nor of any other of the many excitants of such desire has any relation to the purely medical question as to the use of a direct preventive known to be effectual.

Dr. Mackenzie asks me whether I still maintain that this "*subject* is essentially and exclusively medical, and whether I admit the importance of certain social and legislative measures . . . into all of which the moral factor enters." My answer is that the *subject*, as interpreted by Dr. Mackenzie in this double-barrelled question (which is a good example of the *fallacia plurium interrogationum*) has never been said by me to be a medical question, and that I certainly adhere to my statement that the question of the duty of making known the use of effectual preventives against infection is a purely medical one, and is properly answerable by the medical profession alone, as, indeed, it is now being answered very widely in the affirmative.

To argue against prophylactic measures on the ground that they will not "get rid of venereal infection in a day or a generation" is clearly beside the point. If not duly used, no remedy—prophylactic, palliative, or curative—can be effectual. The only sound argument against any given method of prevention is to prove that when properly used it is not preventive.

Lastly, Dr. Mackenzie attempts to traverse my statement that Dr. Otto May urged that this question of prevention was a purely medical one. I did not say that Dr. Otto May used these particular words. But he said, as reported in the Journal of February 10th, that he "was aware that any popular propaganda on the subject of prophylaxis would meet with a good deal of opposition in many quarters, but, all the same, he thought it ought to be persevered with. The sooner the whole question of morality was divorced from methods of treatment of disease the better. The two aspects—the moral and the medical—must not be confused." Dr. Mackenzie's

equivocal use of the word "prevention" is perhaps the source of this misunderstanding. There must be no confusion of attempts to discourage irregular sexual intercourse with direct medical measures taken to prevent venereal infection.

While writing this I have seen in the *Lancet* of to-day's date a valuable contribution on the question of direct prophylaxis by Lieutenant-Colonel James Barrett, R.A.M.C., C.M.G., setting forth the views of important medical authorities in Victoria, and therefore take the opportunity of commending this paper to the notice of all who are interested in this discussion.—I am, etc.,

London, W., March 17th. H. BRYAN DONKIN.

## THE DANGER OF SMALL-POX.

SIR,—In your issue of March 17th, p. 377, you refer to a recent lecture by Professor McWeeney before the Royal Dublin Society, as quoted by Sir Joseph McGrath, Registrar of the National University of Ireland, in which warning is given as to the danger of a serious outbreak of small-pox in Ireland owing to the increasing neglect of infantile vaccination.

The line of argument is as follows: "Small-pox mortality has been falling in Ireland since 1840, and has now entirely disappeared, the last death occurring in 1907. In Ireland, as in Great Britain, a large proportion of the population is at the present time unvaccinated. The proportion of successfully vaccinated children, which in 1905 was 82 per cent., was only 61 per cent. in 1913. *Ergo*, if small-pox should be introduced into Ireland—a by no means improbable contingency—the disease would find an abundance of totally unprotected individuals."

So far I am quite at one with Professor McWeeney. But then comes the statement which I feel bound to take exception to: "It (small-pox) would thus gain in virulence, and ultimately attack persons insufficiently protected by their primary vaccination. A dreadful calamity might thus ensue."

Now, Sir, with all due respect to orthodox opinion on this subject, I wish to suggest that the danger arising from the neglect of infantile vaccination has been much overestimated. I submit that it is not the practice of infantile vaccination which is abolishing small-pox from the British Isles. If that were the true cause of the disappearance of this disease, how is it that small-pox mortality continues to fall *pari passu* with a steady and rapid decrease in the amount of infantile vaccination? Or how is it that in Ireland, where the proportion of children vaccinated has always been less than in Great Britain, the disappearance of small-pox has been most complete? And, most remarkable of all, how is it that small-pox mortality has fallen in unvaccinated Leicester quite as much as, if not more than, in the rest of the country?

I submit that it is not infantile vaccination but other factors, especially modern methods of administrative control—notification, isolation, surveillance and vaccination of contacts, etc.—coupled with improved "sanitation" (using that term in its widest sense) which deserve the credit for having virtually abolished small-pox from our midst, and consequently that there is no sufficient reason for believing that neglect of infantile vaccination is fraught with the serious danger to the community which so many people would have us believe.

As for the statement that the presence of unvaccinated persons causes small-pox "to gain in virulence," this is surely very misleading. (I assume that Professor McWeeney was correctly reported.) It is, of course, true that if unvaccinated persons are attacked by small-pox they suffer from more severe attacks than vaccinated persons; but this is a very different matter from "increasing the virulence," which surely implies that they pass on a more virulent type of the disease to others. I assert that there is no evidence that this is the case. Indeed, here in unvaccinated Leicester the type of small-pox during the thirty years that infantile vaccination has been abandoned has, on the whole, been distinctly below the average in virulence.

Again, there is no evidence to support the suggestion that the unvaccinated section of a community are first affected by small pox and that ultimately the once-vaccinated and partially protected are attacked. The experience of the great majority of outbreaks is that it is the once-vaccinated and partially protected who originate and spread epidemics. This is because mild modified cases in the vaccinated are so easily unrecognized and overlooked. As I have shown elsewhere,[1] infantile vaccination has, for this reason, a very real tendency to spread small-pox. This may seem a hard saying to some, but it is none the less true. As regards the unvaccinated, they should be regarded as the victims rather than the cause of small-pox outbreaks.

Lastly, the reference to the experience of Germany during the present war is surely rather unfortunate for Professor McWeeney's thesis. Behold, Germany, the much vaccinated and revaccinated Germany, which for years has been held up as a shining example and pattern to the world in the matter of vaccination, is now suffering from "several serious outbreaks of small-pox" in various parts of the country! Surely it is time that existing theories about vaccination were re-examined.

To prevent misunderstanding, let me say that I yield place to none in my faith in the power of recent vaccination to protect the individual. What I am out against is the alleged efficacy of infantile vaccination to protect the community. That is a very different proposition.—I am, etc.,

Leicester, March 19th. C. KILLICK MILLARD.

## THE APPLICATION OF SURGICAL METHODS TO THE TREATMENT OF CEREBRO-SPINAL FEVER.

SIR,—Captain Drew's suggestions as to surgical treatment in cerebro-spinal fever (February 17th, p. 223) are interesting, but I should like to offer a few observations.

In the first place I should like to combat the idea that treatment by serum is no more effective than by simple tapping. The statistics of the naval cases published by Surgeon-General Rolleston and our experience here appear to prove that early treatment by serum is of great value. In the series of cases treated at this hospital last winter and spring the mortality in cases treated before the end of the third day of illness was only 9.09 per cent., the total mortality being 21 per cent.

Captain Drew says he cannot understand how the injection of antitoxic serum can affect a completely contaminated cerebro-spinal fluid, and doubts if the serum can penetrate sufficiently unless injected under dangerous pressure. The answer to the first point can only be decided by experience, and with regard to the second Dr. Carnegie Dickson, pathologist to this hospital, proved by experiment with methylene blue on the cadaver of a fatal case of cerebro-spinal fever that fluid injected into the lumbar spine with fifteen inches water pressure reached the brain in a few minutes.

In the early experience of this work my colleagues and I found ourselves desiring a method of continuous spinal drainage, but further experience convinced me that it would be practically useless. In cases doing well daily drainage by lumbar puncture with the administration of serum is quite sufficient. A large majority of the cases which do not do well belong to the class referred to by Captain Drew in which the flow of cerebro-spinal fluid becomes progressively less. In such cases, as we have proved by *post-mortem* examination, the subarachnoid space is narrowed and the communications between the cerebral ventricles and the spinal canal have become blocked. The ventricles thus become closed chambers in which meningococci develop and flourish for long after they have disappeared from the spinal fluid. I cannot conceive how laminectomy and spinal drainage could benefit such cases.

The logically correct way to treat them would be by trephining and drainage of the lateral ventricles, but one naturally hesitates before undertaking such a drastic procedure.—I am, etc.,

A. CHARLES E. GRAY,
Captain R.A.M.C.,
Officer in Charge, Cerebro-spinal Fever Wards,
Fulham Military Hospital.

February 26th.

## THE OLDEST AGE OF PARTURITION.

SIR,—My wife was born on February 5th, 1865. First child born March 31st, 1897. Eighth child born May 31st, 1914, the mother being then 49 years and 3 months old.

I can also vouch for a patient of mine whose first baby

[1] *The Vaccination Question in the Light of Modern Experience, An Appeal for Reconsideration.* London: H. K. Lewis.

was born when she was 19, and the last when just 49. She had, I think, fifteen children, all of whom lived to adult age. The mother, now close upon 80, is still hale and hearty. These cases cannot be so rare as is supposed, for I think I could find more of them.—I am, etc.,

March 18th. COUNTRY PRACTITIONER.

*** Dr. J. B. Garman (Great Barr, near Birmingham) writes that he attended a multipara in August, 1915, aged 49 years and 7 months. He offers to supply further particulars to Dr. F. J. Smith.

### THE WHITE CITY CASE.

SIR,—We have the concurrence of the solicitors to the *Evening Standard* in requesting you to give space in the BRITISH MEDICAL JOURNAL to the following expression of explanation and apology to Dr. Henry Dutch, which appeared in the issue of the *Evening Standard* dated the 2nd March, 1917:

THE WHITE CITY CASE.

*An Explanation and an Apology to Dr. Dutch.*

Our attention has been called to an unfortunate inaccuracy in the report of these proceedings appearing in our issue of February 27th. From our report it would appear as though Mr. Muir said that Dr. Dutch had told Sauge "to drop the Sergeant-Major a quid."

As a matter of fact, Mr. Muir, in making the statement quoted above, was referring to quite a different person, and made no aspersion whatever upon Dr. Dutch. We much regret the inaccuracy in our report, and we are pleased to take the earliest opportunity of correcting any misapprehension and express our unqualified apology to Dr. Dutch for any annoyance caused to him.

We shall therefore esteem it a favour if you will publish this letter in your next issue.—We are, etc.,

HEMPSONS,
Solicitors for Dr. Henry Dutch.

33, Henrietta Street, Strand, W.C.,
March 15th, 1917.

## OUR BELGIAN COLLEAGUES AT HOME AND ABROAD.

IN the report of the meeting of the committee of the Belgian Doctors' and Pharmacists' Relief Fund it was stated that a printed statement had been prepared of the progress and working of the Fund during its first two years, but that it was not considered proper to incur the expense of circulating a copy to all subscribers to the Fund. A short summary of the statement may be of interest. It recalls that the Fund was originated in consequence of representations made by Dr. C. Jacobs, Professor of Obstetrics in the University of Brussels, who came to England in November, 1914, as a delegate and spokesman of a committee of Belgian medical men and pharmacists organized in Brussels. A provisional committee was formed, with Sir Rickman Godlee as chairman, and containing representatives of the Royal Colleges of Physicians and Surgeons, the Apothecaries' Society of London, the Pharmaceutical Society of Great Britain, and the British Medical Association. Dr. S. Squire Sprigge, editor of the *Lancet*, has acted as secretary throughout, and Dr. H. A. Des Voeux as treasurer. By the first week of February, 1915, over £5,000 had been received, and the first disbursement was made for the assistance of refugee Belgian medical men in England. Subsequently the British committee got into communication with a society formed in Belgium entitled, Aide et Protection aux Médecins et Pharmaciens Sinistrés, and the British committee has for some time been transmitting a sum of £800 each month to this society.

A general summary of the financial circumstances shows that the total donations to the fund down to November 30th amounted to £19,500 6s. 5d., including the sums collected by national committees in Scotland and Ireland, the Colonies, and America. Part of the fund was invested in Treasury Bills, and the interest on them and on money on deposit amounted to £826 14s. 6d. The financial position at the close of the second year of working was that £10,000 remained in hand after sending the sum of £800 a month for a considerable period to Belgium for the relief of doctors and pharmacists and their wives. From the beginning of June up to the end of November £627 2s. 8d. was received, and during this period £4,904 was expended, of which £4,800 was the amount of the *mensualités* sent direct to Belgium. A little over £100 was distributed during the same period in small sums in England for the relief of Belgian doctors and pharmacists or their wives or dependants.

The Executive Committee decided to continue the *mensualités* to Belgium for the ensuing four months, though aware that at that rate of expenditure, if circumstances allowed it to be kept up, the sum then in hand would not last more than a year. The question will soon arise as to the form which a new appeal should take.

The address of the Honorary Treasurer of the Belgian Doctors' and Pharmacists' Relief Fund is Dr. H. A. Des Voeux, 14, Buckingham Gate, London, S.W., to whom all subscriptions should be sent. The Honorary Secretaries are Dr. S. Squire Sprigge, the *Lancet* Office, 423, Strand, London, W.C., and Mr. W. J. Uglow Woolcock, the Pharmaceutical Society, 17, Bloomsbury Square, London, W.C. Surgical instruments should be sent to the Master of the Society of Apothecaries, Apothecaries' Hall, Blackfriars, E.C.

# Universities and Colleges.

### UNIVERSITY OF BIRMINGHAM.

PROFESSOR ROBERT SAUNDBY having resigned the chair of medicine in the University, which he has occupied since 1892, including eight years' service in Mason College, the Council of the University at its recent meeting adopted the following resolution:

That in accepting the resignation of Professor Robert Saundby the Council records its great regret that circumstances of health have rendered this step necessary. It desires to thank him for his long and distinguished services to the medical school in Mason College and the University; and the Council takes this opportunity of expressing its appreciation of the invaluable assistance which he has rendered to medical education during the twelve years in which he has represented this University on the General Medical Council.

### UNIVERSITY OF LIVERPOOL.

THE following candidates have been approved at the examinations indicated:

FINAL M.B., CH.B.—*Part I:* L. Farris, P. E. Gorst, G. R. James (Distinction in Pathology); V. E. Jones. *Part II:* W. M. Jones (Distinction in Forensic Medicine and Toxicology, and Public Health), F. A. Prosser. *Part III:* E. S. Stubbs (First Class Honours and Distinction in Obstetric Surgery), I. J. Lipkin (Second Class Honours and Distinction in Obstetrics), P. B. Pinkerton (Second Class Honours), M. Azer, Constance M. Edwards, A. J. B. Griffin, Ruby E. McBirnie, R. Nixon, C. V. Pearson, R. C. Watts.

### QUEEN'S UNIVERSITY OF BELFAST.

THE following candidates have been approved at the examinations indicated:

M.CH.—Dr. J. W. West.

M.B., B.CH., AND B.A.O.—J. Adams, †W. L. Agnew, S. T. Alexander, P. Clarke, J. H. Davison, †W. Harvey, J. H. B. Hogg, L. Jefferson, *R. N. B. McCord, W. C. McCullough, P. J. McSorley, †J. Scott, †J. Wilson.

* First class honours. † Second class honours.

D.P.H.—Dr. Mary G. Caskey, Dr. D. L. McCullough.

# Obituary.

DR. FREDERICK WILLIAM HALLIDAY, of Wortley, Leeds, who died recently, was educated at the Leeds Medical School, University College, London, and Vienna. He took the diplomas of M.R.C.S., L.R.C.P.Lond. in 1887, and subsequently held the office of senior house-surgeon to the Leeds General Infirmary. For the last twelve months of his life Dr. Halliday was medical officer to an important national filling factory, where his work consisted of preventive duties in connexion with trinitrotoluene sickness. At this factory there were over 10,000 employees, and during last winter he lived at his post day and night. There is no question that had he not shouldered this heavy burden of war duties he would still be with us. At the filling factory he had the complete confidence of the management and of the workers; he had an eye like a hawk for the early signs of trinitrotoluene illness. The Ministry of Munitions have lost in Dr. Halliday a man whose services will be most difficult to replace.

DR. PATRICK WILLIAM MAXWELL, who died in Dublin on March 10th at the age of 61, came of an ancient Scottish family, and was born in Glasgow. He was educated at Edinburgh University, where he took the degrees of M.B. and C.M. in 1880 and the M.D. in 1888. After a period of

study in London and Vienna he settled in Dublin, where he took the diploma of L.R.C.P.I. in 1884 and F.R.C.S.I. in 1890. He was appointed ophthalmological and aural surgeon to Jervis Street and Steevens's Hospitals, and later became surgeon to the National Eye and Ear Hospital. He took a great interest in the latter, where he was well known as a stimulating teacher and skilful operator. He was a member of the Royal Academy of Medicine and examiner in ophthalmology at Trinity College and at the Royal College of Surgeons. He was also surgeon-aurist in ordinary to the Marquis of Zetland during his term of office as Lord Lieutenant. He was author of several papers on ophthalmological subjects. Dr. Maxwell is survived by his three daughters, one of whom is on the staff of the Royal Victoria Hospital. His only son was killed in action last year at the battle of Guinchy.

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DR. DAVID RICHMOND JOHNSTON of Reading, who died on February 26th, aged 55, from cerebro-spinal meningitis, was the son of the rector of Killarney. He received his medical education at the University of Dublin and Queen's College, Belfast, and graduated B.A.Dubl. in 1882. Seven years later he took the diplomas of L.R.C.P. and S.Edin. and L.R.F.P.S.Glasg. He had been medical officer to Messrs. Huntley and Palmer's biscuit factory at Reading for more than twenty-five years, and since July last held the post of medical officer to the Royal Flying Corps at Reading; he had suffered from overwork. He had been in attendance on a member of the corps who died from cerebro-spinal meningitis the previous week, and apparently contracted the disease at the *post-mortem* examination. Dr. Johnston was highly esteemed in the district.

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DR. SIDNEY OLIVE BISHOP died suddenly at Farnham, Hants, on February 17th, aged 69. He was educated at St. Bartholomew's Hospital, and took the diplomas of M.R.C.S. in 1872 and L.R.C.S.Edin. in 1873. He afterwards went to India, where he served for many years as a planter's doctor in Assam, on the Bonajan-Dolaguri and other tea estates, and for some time as medical officer of the Golaghat district. He also practised for some years at Darjiling. He was the author of a small book called *Sketches in Assam*, published about 1885.

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DR. FREDERICK WILLIAM HIGGINSON died at Cole House, Jersey, on March 13th, aged 75. He was educated in the medical schools of Trinity College, Dublin, and of the Royal College of Surgeons, Ireland, and took the diplomas of L.R.C.S.I. in 1861, L.M.S.Dub. in 1865, and the F.R.C.S.I. in 1882. He entered the Indian Uncovenanted Medical Service nearly half a century ago, and acted as civil surgeon of various districts in the province of Oudh from 1870 to 1886, when he entered the gaol department, serving as Superintendent of the Central Prison at Benares 1886–90, and 1892–96, and of that at Agra 1890–92. He retired in 1896.

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SIR ALFRED SWAYNE LETHBRIDGE, K.C.S.I., Bengal Medical Service (retired), died at Windhover, Burlesdon, Hampshire, on March 11th, aged 72. He was the son of Mr. W. F. Lethbridge, of Woolborough, Devonshire, born in Tirhut, Bihar, on September 30th, 1844, was educated at King's College, London, and at Aberdeen University, where he graduated M.B. and C.M. in 1865, and M.D. in 1867; he took the M.R.C.S. in 1865, and the Sanitary Science Certificate at Cambridge in 1876. He entered the I.M.S. as assistant surgeon, passing in first, on September 30th, 1867; became surgeon on July 1st, 1873, surgeon-major on September 30th, 1879, and brigade surgeon-lieut.-colonel on April 9th, 1892, retiring with an extra pension on April 1st, 1898. The *Army Lists* assign him no war service. Most of his service was spent in civil employment and on extra-professional work. After acting as sanitary commissioner, first of Burma and then of Bengal, he became Inspector-General of Prisons in Bengal about 1878, and held that post till in April, 1892, he was appointed to the political department of the Government of India as superintendent of the Thagi and Dakaiti department. In 1890 he served as president of the Factory Commission, and from February, 1895, to January, 1897, was an additional member of the Legislative Council of India. He was decorated with the C.S.I. on May 21st, 1890, and with the K.C.S.I. on May 20th, 1897. Sir Alfred was one of the ablest officers who served in the I.M.S. during the past generation. The present gaol department in Bengal was practically organized by him. As head of a large and important department, he was not only firm and just, but also extremely popular, having the rare but very valuable faculty of administering reproof in such a way as to make the recipient feel that he was really in the wrong.

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LIEUTENANT-COLONEL SARKIES CARRAPIAT SARKIES, Madras Medical Service (retired), died in St. Thomas's Hospital, after a long illness, on March 7th, aged 60. He was born on September 4th, 1856, educated at St. Thomas's Hospital, and took the diploma of M.R.C.S., as well as the Edinburgh double qualification, in 1878. Entering the I.M.S. as surgeon on March 31st, 1879, he became surgeon-major on March 31st, 1891, and lieutenant-colonel on March 31st, 1899, retiring on May 6th, 1910. He served in Afghanistan in 1879–80, and received the medal.

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FLEET SURGEON HORACE ELLIOTT, R.N.(ret.), died at his residence at Sydenham recently, aged 59. He was educated at Westminster Hospital, and took the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1878, and the degrees of M.D. and M.Ch. of the Royal University of Ireland in 1883. After serving as house-physician of the North Staffordshire Infirmary, and as senior house-surgeon of Macclesfield Infirmary, he entered the navy, and attained the rank of fleet surgeon on February 16th, 1901. During the South African war of 1899–1901 he served as staff surgeon of H.M.S. *Philomel;* he was in charge of wounded at Lambart's Bay and at Lorenzo Marquez, and received the Queen's medal with the Natal clasp.

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PROFESSOR ANGELO BATTELLI, the distinguished Italian physicist who died recently, was the author of a treatise on the applications of electricity in medical practice. He was born at Macerata Feltria (Pesaro) in 1862, and held chairs successively at Cagliari, Padua, and Pisa. He won two prizes of the Royal Academy dei Lincei and a Bressa prize. He was a member of the Chamber of Deputies, where he sat on the left.

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DR. CLAUDE LAMONT WHEELER, editor of the *New York Medical Journal*, died on December 30th, 1916, in his 53rd year. He was born at Montreal in 1864, and educated at the Laval University, Quebec, and at McGill University, Montreal, where he graduated in medicine in 1889. Twenty-six years ago he settled in New York as an ophthalmologist, being attached to the Manhattan Eye and Ear Hospital and the New York Polyclinic Hospital. In 1902 he joined the staff of the *New York Medical Journal*, becoming editor in 1911. He was an accomplished musician, a good linguist, and had a considerable literary gift.

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DR. PAUL REDARD, a well-known orthopaedic surgeon of Paris, who recently died of pneumonia contracted in the course of work in military hospitals, took his doctor's degree in 1879. In 1884 he was appointed surgeon to the Furtado-Heine Dispensary. He was the author of monographs on torticollis, spinal curvature, and orthopaedic gymnastics; of a textbook of orthopaedic technique and of an atlas of radiography. He held appointments in connexion with the State railway service of France and was chief physician to the opera. On the outbreak of the war he took an active part in organizing services of orthopaedics and electrotherapy in the military hospitals to which he was attached.

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DR. EDWARD MARSHALL BUCKINGHAM, who died on December 23rd, 1916, was born in Boston, Mass., in 1848, and graduated at Harvard in 1874. He was visiting physician to the Children's Hospital and the Boston City Hospital. For a long time he was instructor in children's diseases at Harvard, and he held the offices of vice-president of the American Pediatric Society and president of the New England Pediatric Society. For twenty years he was treasurer of the Massachusetts Medical Society. He was the author of many papers on subjects within his special province of practice.

# Medical News.

MR. HUGH MALLINSON RIGBY, F.R.C.S., has been appointed surgeon to Queen Alexandra's household.

THE Wellcome Historical Medical Museum will be closed from April 1st to the 30th, inclusive, for cleaning.

THE house of the Royal Society of Medicine will be closed from Thursday, April 5th, to Tuesday, April 10th, both days inclusive.

AN anonymous gift of £20,000 has been received by the Petrograd Higher Institute of Medicine for Women for the foundation of scholarships in the name of Count Vorontzoff, who died in 1916.

THE annual general meeting of the Medical Sickness Annuity and Life Assurance Friendly Society will be held at the offices of the Society, 300, High Holborn, W.C., on Tuesday next, at 4.30 p.m.

A PAPER by Surgeon-General Sir C. Pardey Lukis, K.C.S.I., K.H.S., M.D., F.R.C.S., on opportunities for original research in medicine in India, will be read by Surgeon-General Sir R. Havelock Charles, G.C.V.O., President of the Medical Board, India Office, at a meeting of the Indian Section of the Royal Society of Arts, on Tuesday, March 27th, at 4.30 p.m. The paper will be followed by a discussion.

MEMBERS of the medical profession interested in physical methods of treatment for disabled soldiers are invited to view the Red Cross Clinic for wounded and disabled officers at 126, Great Portland Street, W., on Thursday or Friday afternoons, March 29th and 30th, between 3 and 6 p.m. A short account of the methods of treatment, and of the measuring instruments employed, will be given each day at 4 p.m. Tea and coffee.

THE fourth National Congress of Medicine of Cuba will be held at Havana in the second fortnight of December, 1917, under the presidency of Dr. Aristides Agramonte. The work will be divided among eight sections: general medicine; general surgery; hygiene and demography; laboratory research; diseases of the eye, ear, nose, and larynx; pharmacy; odontology; and veterinary medicine.

AMONG the persons "of distinguished eminence in science, literature, the arts, or for public service," recently elected by the committee of the Athenaeum Club, is the Right Hon. Sir William MacGregor, G.C.M.G., C.B., late acting High Commissioner for the Western Pacific. Sir William, who is a Doctor of Medicine of the University of Aberdeen, is one of the most distinguished of the medical men who have exchanged their original profession for a public career.

ACCORDING to the *Chronique Médicale* of March 1st there are at present two medical candidates for vacant chairs in the Académie Française. One is Dr. Paul Vigné d'Octon, a well-known novelist; the other is Dr. Henri Fauvel, who comes forward as a successor to Jules Lemaître, whose pupil he was at the Havre Lycée. He is the author of a novel, *Le Docteur Jobert*, and of several volumes of verse, the principal of which is entitled *Ressouvenirs*. Dr. Fauvel was a friend of Gustave Flaubert, Alfred de Vigny, and Théophile Gautier.

The annual service of the Order of St. Michael and St. George will be held in the Chapel of the Order in St. Paul's Cathedral on Monday, April 23rd, at noon. The banners of Sir Charles Tupper and the Earl of Jersey, deceased, will be removed, and those of the Earl of Dudley and Lord Robson will be affixed. The West door will be reserved for members of the Order and others who have received tickets. Relations of deceased members who desire to be present should apply to the Prelate at the Chancery of the Order, Colonial Office, S.W.

THE *Medical Record* of February 17th states that the American Red Cross officials estimate that in case of war the force which could be mobilized immediately would include: Twenty-six completely equipped army and navy base hospital units, with a total of 1,250 nurses and 549 nurses' aids; hospital base reserve of 415 nurses and 525 nurses' aids; thirty-one partly complete navy detachments of 20 nurses each; one hundred and fifteen local emergency detachments; and corps of expert instructors in surgical dressing, totalling about 120. It is also estimated that the organization can put into the field 2,920 trained Red Cross nurses, and that if 30 per cent. of those to whom the Red Cross has given elementary training respond as nurses' aids the total nursing personnel will be about 5,000. With the customary assignment of ten patients to each nurse it would thus be possible for the Red Cross at once to undertake the care of 50,000 sick and wounded.

# Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C., on receipt of proof.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Mediocra, Westrand, London;* telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

## QUERIES.

H. asks for advice in the treatment of neuralgia in the stump after hysterectomy performed seven weeks ago; it is alleviated by rest, but not influenced by drugs.

## LETTERS, NOTES, ETC.

INOCULATION AGAINST TYPHOID IN THE CIVIL POPULATION.

DR. JAMES J. HARDING (Ballincollig) writes: If typhoid fever has been banished from the armies by inoculation, is there any special reason for supposing inoculation would fail amongst the civilian population? If the reply is in the negative, am I not entitled to suggest that the profession has "gone to sleep"?

HOLIDAYS ON HOME SERVICE.

BRISTOL writes: "Battalion M.O." has been less favoured than some doctors I know who have had half a dozen leaves in as many months from Salisbury Plain camps. I am still inclined to think that civilians get less leisure than those in the R.A.M.C.

THE WAR AND THE SUPPLY OF DRUGS.

DR. J. S. MANSON (Warrington) writes: In your comments on Mr. F. A. Hocking's paper to the Royal Society of Arts (March 10th, p. 339) reference is made to the scarcity of bromides due to the stoppage of supply from the Stassfurt deposits. One may ask, Why are we so dependent on Germany for this indispensable salt of medicine and photography when sea salt and the brines of Cheshire contain bromines in the form of sodium bromide in appreciable quantities? Calvert, in his *Salt in Cheshire*, shows that the Marston brine contains 11 parts of sodium bromide in 100,000 parts of brine and the Wheelock brine 20 parts per 100,000. Thorpe's *Dictionary of Applied Chemistry* states that Scotland provides a minor contribution to the supply of bromides, probably derived from sea salt. With the present price of bromides it would seem worth while to extend and develop this branch of chemical industry and so free us of dependence on others for the supply of this invaluable drug.

TOBACCO AS FLEA BANE.

DR. S. MALLANNAH, chemical examiner and bacteriologist to H.H. the Nizam of Hyderabad, writes to say that he believes tobacco to be a genuine flea bane if properly used. The proper method is to spread tobacco leaves liberally over the floors of rooms where people sleep, and, he adds, that as 85 per cent. of cases of plague occur in single-roomed houses the experiment he is carrying out will be both easy and cheap. His plan is to select a highly infectious locality of a plague-stricken city, and to spread black tobacco leaves, known locally as narasapuri, on the floors, and to put powdered tobacco into cracks and holes of half the houses; the other half are left untreated. The same method, he says, destroys bugs and has deleterious effects upon mosquitos and flies.


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